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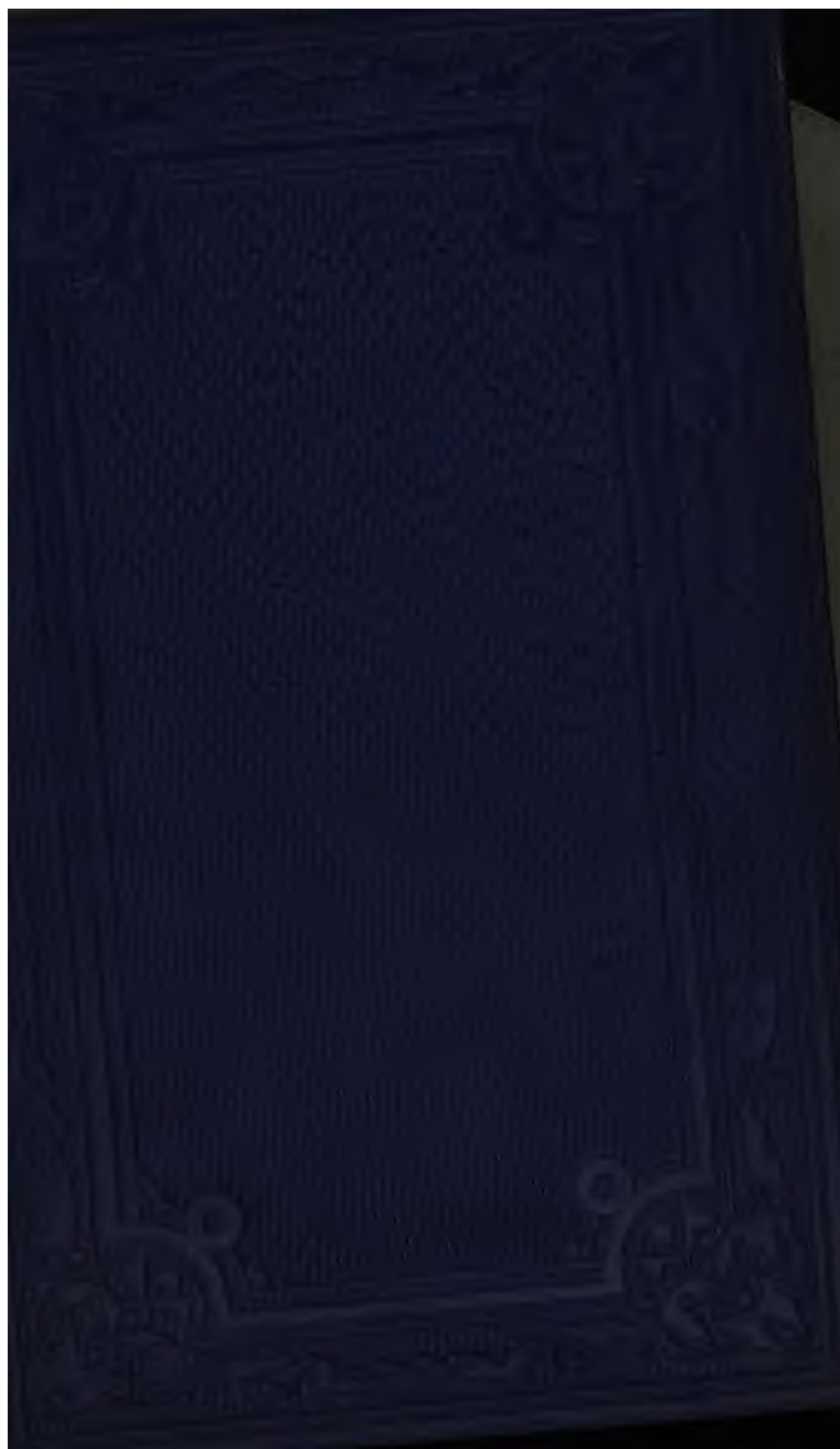
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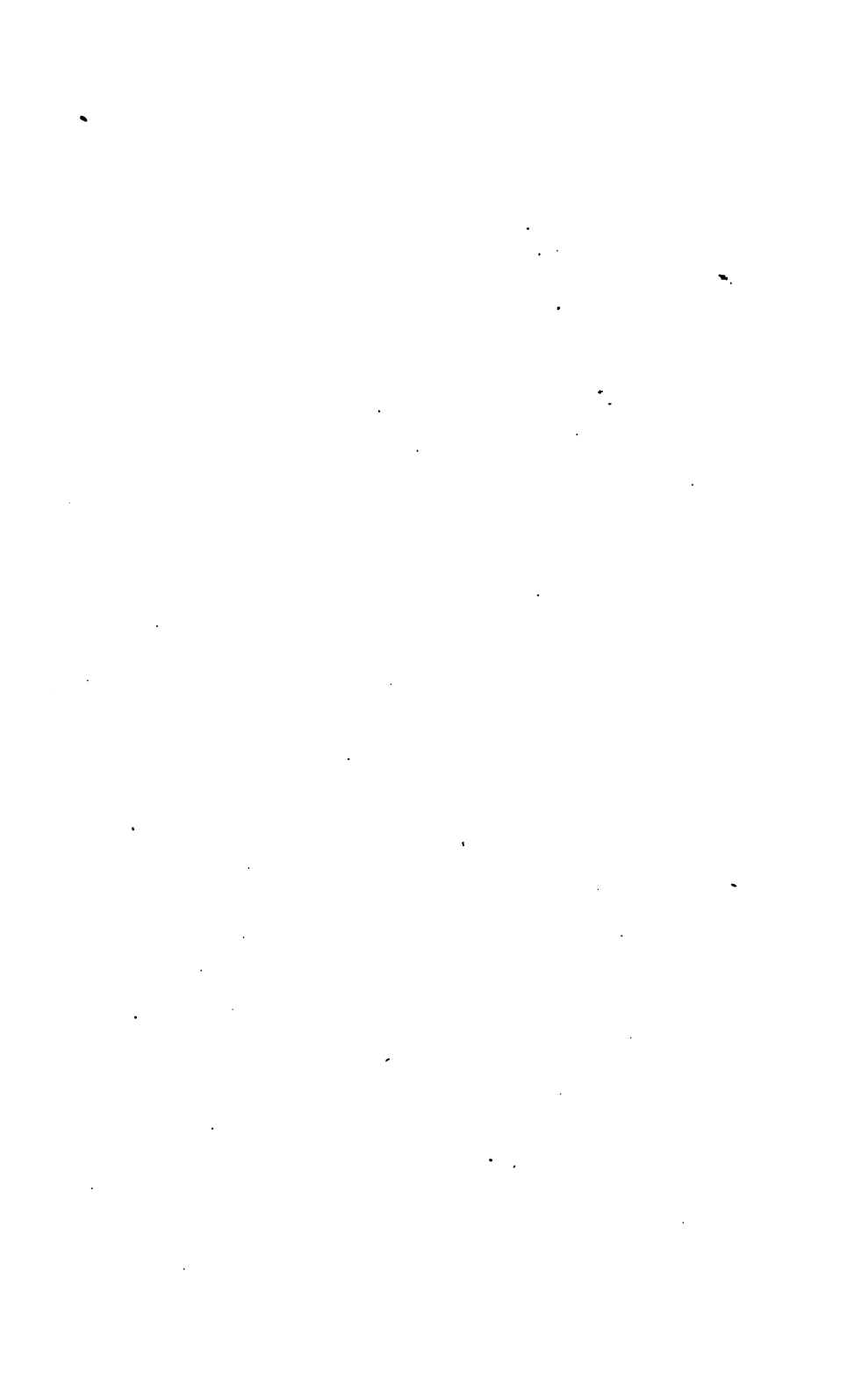


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CURIOSITIES OF TOIL.

AND OTHER PAPERS.

VOL. I.



CURIOSITIES OF TOIL

AND OTHER PAPERS.

By DR. WYNTER,

AUTHOR OF "CURIOSITIES OF CIVILIZATION; BEING ESSAYS FROM THE QUARTERLY
AND EDINBURGH REVIEWS;" "OUR SOCIAL BEES;" ETC.

IN TWO VOLUMES.



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PREFACE.

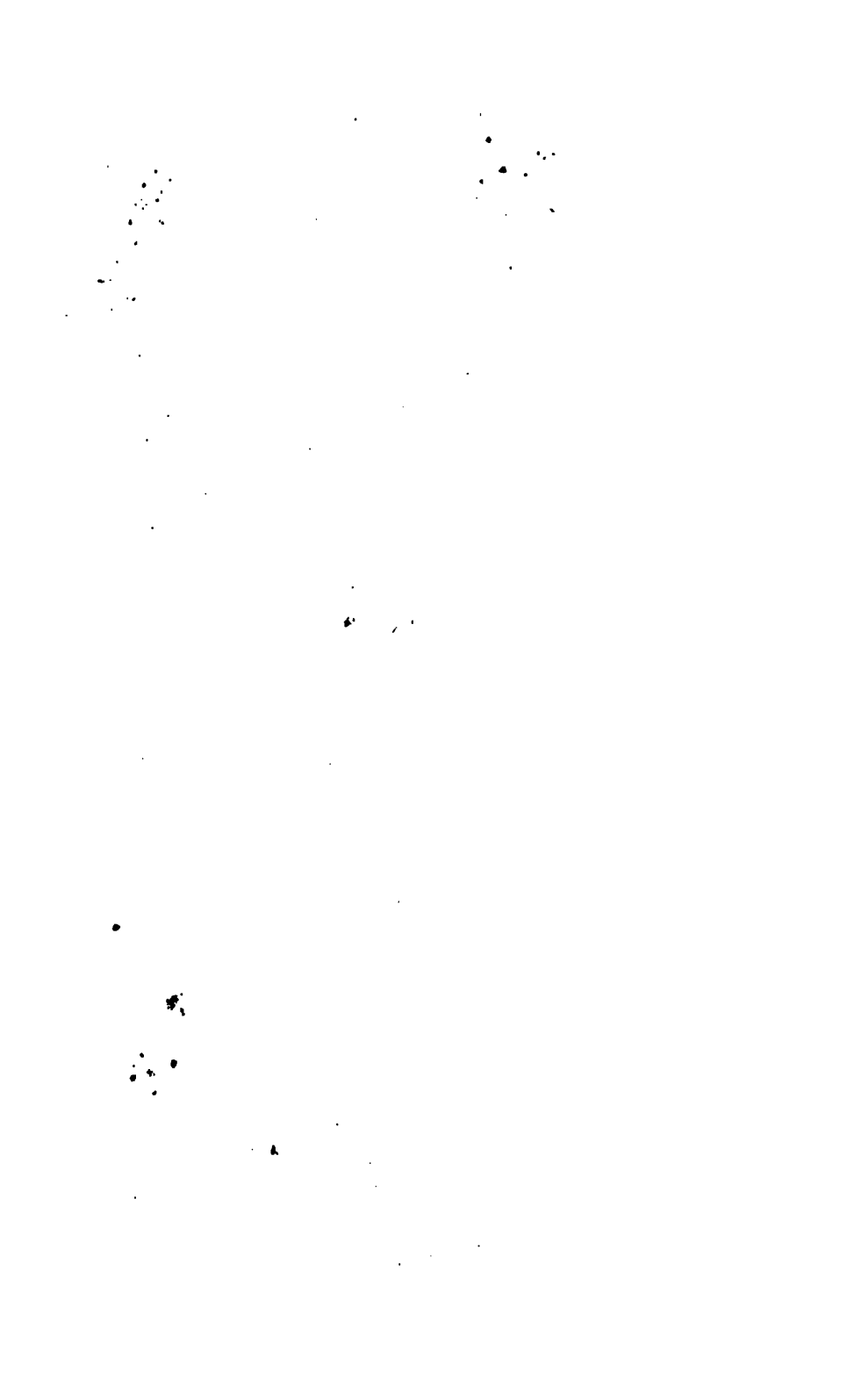
THE following articles, which have appeared of late in various publications, are all more or less associated with the more curious examples of toil, whether they be that of rogues, or of the more respectable workers in our industrious hive; the title I have adopted may therefore, I trust, be allowed.

The articles on "The Use of Refuse," and "Wine, and the Tricks of the Wine Dealers," have already appeared in the *Quarterly* and *Edinburgh Reviews* respectively; the shorter articles have been published mainly in the *Times*, *Good Words*, *London Review*, *Cassell's Magazine*, &c.

THE AUTHOR.

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CURIOSITIES OF TOIL,

AND OTHER PAPERS.

THE USE OF REFUSE.

In the economy of Nature waste is unknown, and we may be sure that with her nothing is lost. That which to our senses appears to be destroyed is only changed in the universal alembic, or simply removed from one place to another. When, in the midst of the parched desert, the water-bag borne by the camel bursts, the liquid may be absorbed by the burning sand, but it rests there only for a brief space. The water at once begins to evaporate, and perchance is deposited at the roots of some neighbouring date tree, whose fruit may refresh some succeeding traveller. Yet the loss is still a real calamity to the caravan, though Nature will not arrest the silent action of her laws to suit the local and immediate necessities of mankind. That the food of the globe, and every material subserving man's necessities and conveniences, are vastly in excess of his wants, there can be no manner of doubt; but if they

are removed by vast distances, by oceans and deserts, from his reach, they are to him practically waste substances. It is no consolation to a starving people to say that such supplies are not really squandered: to them they are as useless as though they had never existed. Man that lives from day to day must be able to realise the gifts of Nature, otherwise he perishes. If he cannot avail himself of the abundant table she spreads where there are no guests to partake of her bounty, he can humbly and at a great distance imitate her actions and copy her thriftiness. The science of chemistry has put into his hands the key by which many of her secret recesses can be reached; and step by step, like a timorous child, he is beginning to wander into the land of wonders that is opened unto him. As yet he is only on the threshold of these hidden recesses; but day by day he advances with steps more assured, and is beginning to see that, with much scientific labour, he can accomplish some things which Nature is always accomplishing, apparently without effort, by the action of her eternal laws. Many costly products of distant lands he now procures at home from the most unlikely sources. Scientific investigation has made "Arabian airs" from the most offensive refuse, and calls forth splendid dyes from substances pitchy black. In this way our stores are replenished, and it often happens that dearth, by the energy it gives to human research, is turned into plenty. But there are thousands of materials which have long been subservient to mean purposes, and

which, therefore, cannot strictly be called waste substances, that are yet capable of taking a much higher place in the world's uses. In this respect they are like men. A lucky accident may give an individual the opportunity of displaying qualities which lead to a throne ; and, in the same manner, some peculiar want may transform a comparatively worthless article to a high place in commercial estimation. In the arts, vicissitudes of this kind are continually taking place. There are other matters, again, that are at present altogether undeveloped ; they are visible to the eye, but we know not to what use to put them. They constitute a kind of available reserve, upon which at any moment we may have occasion to draw.

The absolute economy of Nature, which turns every scrap to some ultimate account, man has necessarily observed, and when compelled by circumstances, as in China, he has long put in practice. But our strictest economy in England is profuse waste compared with the care with which every scrap is turned by the Celestials to the best account. The pressure of population, which has brought this thriftiness about, is, however, beginning to tell upon European people ; and thousands of materials are now turned to account, that not very long ago were utterly unutilised. And thriftiness begets thriftiness, as waste begets waste. There are scores of manufactures which produce by-products, that almost necessitate supplementary factories to use them up ; and we shall presently show that in one prominent article an original factory is supplemented

in this manner by two others, the one digesting the other's refuse.

The refuse of one household seems an insignificant matter in detail, and not worthy of much attention ; but, when it is multiplied by the 500,000 houses in the metropolis, it forms an item of no mean importance, and is of no inconsiderable value. Formerly, the dust-yards, or lay-stalls, as they were called, were conspicuous by their hills of refuse, which towered high over the surrounding houses ; upon these highlands swine depastured, and we are told that there was no fattening ground like these dust-heaps, full as they were of all kinds of perishing animal and vegetable refuse. But the health of the metropolis was of more importance than the fattening of hogs ; and for years past the dust contractors have been obliged to separate and disperse their rubbish as soon as the dust-carts arrive. A more interesting example of the use of refuse could not well be afforded than we find in the yards of these dust contractors, nor a more pregnant example of the value in the aggregate of that which householders consider a mere nuisance, to be got rid of as quickly as possible. That which we throw away in the dust-bin day by day, because we fancy it is an eyesore and past repair, is, in fact, but arrived at that stage in its existence at which it is destined to reascend in the scale of value, and once more minister to the wants of men. There is not one particle in the heap the scavenger removes from our houses that is not again, and that speedily, put into circulation and profitably em-

•

ployed. No sooner is the dust conveyed to the yard of the contractor than it is attacked by what are called the "hill women," who, sieve in hand, do mechanically what the *savant* does chemically in his laboratory—separate the mass, by a rude analysis, into its elements. The most valuable of these items are the waste pieces of coal, and what is termed the "breeze," or coal-dust and half-burnt ashes. The amount of waste that goes on in London households in this item of coal can hardly be conceived, unless the spectator sees the quantity that is daily rescued in these yards. It may be measured by the fact, that after selling the larger pieces to the poor, the refuse "breeze" is sufficient to bake the bricks that are rebuilding London. Most of the dust contractors are builders as well, and the breeze is used by them for the purpose of embedding the newly-made bricks into compact square stacks, which are seen everywhere in the suburbs of London. The breeze having been fired, the mass burns with a slow combustion, aided by the circulation of air, which is kept up by the method of stacking; and in the course of two or three weeks the London clay is converted into good building material. Thus our houses may be said to arise again from the refuse they have cast out, and not only are the bricks baked by their aid, but they are built in part with mortar made from the road-scrapings, which are pounded granite, and combine very well with the lime and ashes of which the mortar is composed. Nay, even the compo, with which some of the smaller houses are

faced, is very largely adulterated with this particular refuse.

The other constituents of the dust-heap are separated by the sifters with the utmost rapidity. Round every hillock, as it is emptied, they congregate with their sieves; and in a very short space of time bones, rags, paper, old iron, glass, and broken crockery are eliminated from the mass and piled in separate heaps. The bones are put to a score of different uses. Several tons are picked weekly out of the metropolitan dust; but, of course, this does not represent the whole of the animal refuse of this kind, but only that taken from cooked meat. After we have discussed the joint at the table, there is still much value remaining in the residual bones. They go immediately to the boiling-houses, where every portion of fat and gelatine they can yield is extracted; the former goes to the soap-maker, the latter is utilised to make the patent gelatine packets now in use for a score of different purposes. The bones that possess any size and substance are used by the turners, and are converted into the hundreds of knick-knacks for which they are suitable; possibly, good reader, the same bone you may have picked at dinner re-enters your mouth after many changes in the shape of a toothpick or toothbrush! whilst the smaller pieces are calcined, and form the very tooth-powder you use with it. But the grand destination of the smaller fragments is the earth. Ground very fine, and treated with sulphuric acid, they make the celebrated super-phosphate manure, one of the best known fertilisers.

Thus the old bones go to form and nourish new bones. The wealth of England has attracted towards herself the old bones of half the Continent, not only animal but human, for many an ancient battle-field has been searched for its valuable remains,—thereby enabling us to grow such splendid crops by supplementing the resources of our fields. Thus the threat of the Giant to Jack—

“ Let him be live,
Or let him be dead,
I'll grind his bones to make my bread,”

is no fairy tale after all, but a common verity. Another very important product extracted from bones is phosphorus, a constituent of the brain and nervous system, one of the substances which give us light in the match, and without which we and our households would fare but poorly. The fat that is saved in the process of boiling goes, as we have said, to make the commoner kind of soap, or is useful to the arts in a hundred ways. What diverse forms of a new life await the old bone as the rag-picker recovers it from the ash-heap ! Its substance, in the form of handles of knives, chessmen, paper-knives, &c., mingles with the every-day concerns of life—its hard work and its enjoyments and intellectual amusements ; whilst in its fluid and manurial products yet more astonishing changes attend it the moment it falls into the hands of the manufacturer. Its fatty particles give us cleanliness and purification in the form of the “ bar of yellow ;” and its phosphorus helps to give us ready illumination.

The difficulty we feel in dealing with this seeming rubbish that we kick out of the way with our foot is to follow it out into the many diverse forms it assumes upon its resurrection.

But there are other articles in the dust-bin which await us—for instance, there are scraps of paper. These are all carefully sorted, the white from the coloured and the printed. The soiled pieces, which cannot be profitably re-manufactured as paper, are used to make papier-mâché ornaments, dolls' heads, &c.; the clean paper is returned to the mill, and even the printed paper has the ink discharged from it, and goes again into circulation. Old rags, of course, are valuable to the paper-maker, although the discovery of other materials will possibly render this form of waste not quite so important a matter in his eyes as it was some time ago. We shall revert to this question more at length, however, when speaking of paper-making materials. But what can be the destination of greasy dish-clouts? Woollen material, if clean, does not descend to the earth in the scale of civilisation; but there is too much grease in the dish-clout to go again to the mill, so it is destined to nourish the noble hop in the Kentish grounds. As the old saying has it, "when things are at their worst they mend." Woollen rags, if they happen to be dyed scarlet, are treated for the recovery of their cochineal, which is very valuable for dyeing purposes, &c.; and other valuable coloured rags are separated to be ground up and make flock-paper. But these are fancy uses: the great market

for all old woollen fabrics which are too tattered to be worn is the town of Batley and its neighbourhood, in Yorkshire, the great shoddy metropolis. To use the words of a contemporary :—

“Not the least important of the manufacturing is Batley, *the chief seat of the great latter-day staple of England, Shoddy*. This is the famous rag-capital, the tatter-metropolis, whither every beggar in Europe sends his cast-off gentility of moth-eaten coats, frowzy jackets, worn-out linen, offensive cotton, and old worsted stockings—this is their last destination. Reduced to filaments and greasy pulp by mighty toothed cylinders, the much-vexed fabrics re-enter life in the most brilliant forms—from solid pilot cloths to silky mohairs and glossiest tweed. Thus the tail-coat rejected by the Irish peasant, the gabardine too fine for the Polish beggar, are turned again to shiny uses; reappearing, it may be, in the lustrous paletot of the sporting dandy, the delicate riding-habit of the Belgravian belle, or the sad, sleek garment of the confessor. Such, O reader, is shoddy !”

We all remember how “Devil’s dust” was denounced some years ago in Parliament. If it were not for this shoddy which created it, the clothes of Englishmen, both rich and poor, would be augmented in price at least five-and-twenty per cent. As it is, a cheaper woollen garment can be purchased now than thirty years ago, notwithstanding that the expenses of living have considerably augmented since that time. Formerly these old woollen rags went to the land; but since they have been brought back to their old uses, an enormous quantity of cloth-making material has been added to the general stock. As long ago as 1858, it was estimated that 38,880,000 lbs. of this rag-wool are annually worked up into cloth, and this quantity was quite irrespective of the importations from abroad, which were very large indeed. In the nine years (1867)

that have elapsed since that time the quantity must have greatly increased, yielding an amount of wool equal to many million fleeces annually! Cotton and woollen rags are both valuable commodities when separate, but of late years it has been the custom to weave the cotton and the woollen together. The warp being of the latter material and the weft of the former, thus mixed together they were both spoilt, as they could neither be converted into paper nor cloth. Many endeavours have accordingly been made to separate them. One of these for a time succeeded. The woollen fabric was saved, and the cotton destroyed; but it has, we believe, been found that the felting qualities of the wool thus rescued were injured by the process adopted. Within these last few years the original process has been reversed. These "Union fabrics" are now placed in a closed receiver, and subjected to steam at a very high temperature. The result is that the cotton comes out pure and fit for the paper-maker; the wool is reduced to a dark brown powder, known as the "ulmate of ammonia," and is employed to enrich manures which are poor in nitrogen. So much for old rags.

But we are far from having exhausted the contents of the dust-bin yet. There are the old iron, battered saucepans, old housemaids' pails, rusty hoops, horse-shoes, and nails from the road. All soldered articles have the solder extracted from them (as it is more valuable than the iron), and the cheaper metal is then remelted. The horse-shoe nails are not mixed with

the common cast-iron, as they are much sought after by gun-makers for the purpose of making Stubb twist barrels. This is a roundabout way to get tough iron it is true, and it remains as an instance of an improved product brought about by accident: it is like the Chinese method of discovering roast pig. Perhaps, following out this idea, some quicker and less laborious method of making cohesive gun-barrels will be discovered than the banging of horses' feet upon the granite pavement.

Scraps of iron, it is found, may be made very useful in securing the copper that runs away in the streams washing veins of copper pyrites. In the Mona Company's mines in North Wales, old pieces of battered iron are placed in tanks into which these streams are collected; the copper quickly incrusts the iron, and in process of time entirely dissolves it, so that a mass of copper takes the place of the iron. The residuum, in the shape of a coloured deposit, is at times taken out, dried, and smelted. Before the adoption of this plan, a great deal of copper escaped as a refuse into the sea. Indeed, this simple laboratory device has become, during the last few years, an expedient on the manufacturing scale: the poorest copper ores, which at one time did not even pay for working, now have the metal extracted from them at a profit, by a process of which this is the penultimate stage.

Glass, so much of which in its manufactured form is destroyed in our households, is carefully collected, and of course goes again to the melting-pot. The most

fragile and destructible of materials when manufactured, it is, perhaps, one of the most indestructible of all known substances; and very possibly there is plenty of it which has been melted over and over again for centuries now doing good service in the world. Glass bottles, especially physic bottles, go to the dust-yards with great regularity, and with the same regularity they find their way back to the druggists' shops, going the same dull round year after year, and no doubt are present at the death of many to whom they have ministered. Old boots and shoes, when not too far gone, find their way to Monmouth Street, Seven Dials, where they are patched up with heelball, and made to look decent, even if they should not prove very serviceable. In any case good sound pieces of leather are turned to account. India-rubber goloshes, and all articles made of caoutchouc, whether vulcanised or not, are remelted and mixed with the new gum, the refuse being obtainable at from £17 to £18 per ton, and the raw material at not less than £200 a ton. The dust-heap is now pretty well exhausted; there are the soft core and the hard core, the decaying vegetable matter, and the broken crockery. The former goes to feed the pigs, and the latter makes excellent foundations for roads. The vegetable refuse from Covent Garden, which is very large, is removed morning and evening, and goes to feed the cows and the pigs in the neighbourhood of the metropolis.

In turning to animal refuse, we may refer to one disgusting example in the shape of dead dogs that are

seen floating on the Thames, polluting the very water we drink. Why, we ask, should they not be utilised? In Paris and New York every portion of the carcasses of dead dogs is utilised; they are boiled down for the fat, whilst the skins are sold to glovers, and the bones go to make superphosphate. Every portion of a dead horse finds its use: indeed, there are a score of trades which depend upon the knacker's yard. In Paris the carcasses are worth more than in this country, inasmuch as the working classes eat the best portions of the flesh, but otherwise the value of the different parts is about equal. The hair is a well-known refuse, used by the upholsterer; the hide goes to the tanner to make leather for large ledgers, &c.; the intestines make coarse gut-strings for lathes and wheel-bands; the fat, which from a well-conditioned horse sometimes amounts to 60 lbs., is worth 6*d.* per lb. The hoofs are used either by the turners or the Prussian-blue makers, and the bones go to the makers of ivory-black and turners; even the putrid flesh is allowed to breed maggots, which our Parisian friends sell as food to fatten fowls, and the final residue is turned into a trap to catch rats. Some years ago, the inhabitants of Montfauçon, near Paris, fearing that, like the Bishop of Mayence, they might be eaten up by the enormous number of rats which congregated there in consequence of the vicinity of slaughter-houses for horses, caused the Government to appoint a Commission to inquire into the matter, and the Commissioners in their report stated that the proprietor of one of the slaughter-

houses had openings made in the walls, and deposited therein the carcasses of two horses. When the night came he stopped up all the holes, and went in with his men to kill the rats. Night after night this trap was set, and at the end of one month he had killed 16,050 rats. As the furriers will buy them at 3s. a hundred for their delicate fur, he did not make a bad thing of it. The skins are also exceedingly flexible and fine, being far more resilient than even the best kid; so much so that the glovers buy them to make the thumbs of gloves.

These examples of the utilisation of the waste of great cities, although large in the aggregate and disagreeable in their details, do not strike the reader as examples of refuse noxious to the public health or deleterious to our water supply. For centuries every product that was considered worthless or a nuisance was got rid of in either of two ways: if liquid it was cast into the river, if gaseous it was allowed to escape into the air. The most important example of liquid refuse is the sewage of London. The excreta of three-and-a-half millions of people, flowing languidly in the sewers beneath their feet, was indeed an instance of refuse on such a gigantic scale, that the authorities were forced to deal with it, and the scheme of drainage just completed on the northern shore is the result. The value of this sewage Professor Way has estimated at two millions per annum, and whilst we were absolutely throwing this away we were ransacking the islands of the Pacific for guano, a refuse that had lain there for

ages untouched by the hand of man. A more flagrant example of wilful waste on our part could not well be quoted, inasmuch as guano, though obtained at a very high cost, is not so valuable as that we had ready at hand, when in a concentrated form. Not a great many years ago the night-soil was regularly emptied from the metropolitan cesspools by a special service of nightmen, and, being mixed with ashes, was removed at once to the fields. But the invention of the water-closet destroyed this organisation. The sewage was turned into the sewers constructed to carry the rainfall only, and thence escaped into the river, after festering beneath our feet for a considerable time. The river, in consequence, was polluted, and the fish were poisoned as far as its tidal flow extended. This was to a certain extent a retrogressive step—the creation of a gigantic nuisance, and the establishment of a perpetual drain of a most valuable fertilising agent.

In China, the market-carts that bring in the vegetables to market return with this fertilising agent properly secured, and it is at once rendered applicable to the purposes of the land. The Celestials act upon the principle that they must return religiously to the soil those materials they have taken out of it, and the result is that their fields are the most productive in the world, and have supported a larger population than any other land for a longer time. This example of the Chinese has, indeed, been imitated in another form in these islands for many years. Instead of carrying the sewage, it has been made to carry and distribute itself near

Edinburgh for a couple of hundred years. The Craightenny meadows were originally prolongations of the sea beach, and worth only 5s. an acre. They are flooded ten or twelve times a year with the sewage of the western part of the city, which, after saturating the soil, flows off into the Frith. There are about 200 acres thus irrigated on the catchwater system, and the crops of Italian rye-grass are prodigious, on some occasions as much as sixty tons per acre at one cutting, but averaging forty-five tons, with a money value of £25. As many as five crops have been taken off in the course of one year. The success of the experiment has been ascribed to the fortunate lie of the land, which allows the sewage to flow downwards by its own gravity ; but as it is ascertained that a hundred tons of sewage can be lifted a hundred feet for a penny, the value of gravitation need not be taken much into account in the problem. The expense of irrigating these famous meadows does not exceed £1 an acre per annum, and the gauge of the value of the system under which they are managed is the extraordinary rise that has taken place in the value of the meadows themselves—from 5s. to £30 per acre. At intervals similar experiments have been made in England, notably those at Rugby and Croydon, which, being conducted on principles which could not well yield a decisive result, discouraged many agriculturists from using sewage ; but since then many most convincing experiments, conducted by private establishments, have placed beyond all doubt the value of this unpleasant refuse.

The Second Report of the Parliamentary Committee on the Sewage of Towns gave the following examples in evidence. Mr. Philip Skinner Miles, a well-known agriculturist in the neighbourhood of Bristol, tried the experiment by applying the sewage of his household of thirty persons to about twelve acres of land, and the result was an immense success. The land has improved in value from £2 15s. an acre to £5 10s., and the crops have greatly increased, and are always good, whether the season be wet or dry. At Colney Hatch and Hayward's Heath Lunatic Asylums experiments have been successfully carried out for many years; but we would more particularly refer to the schools at Anerley, containing seven hundred children, where the details were carried on under the eye of the Government Inspector, Mr. Tufnell, who testifies to the truthfulness of the results. The crops yielded seventy tons per acre, and were tried side by side with guano-manured land, and found to be far more productive. Now that a great portion of the main drainage of the metropolis on the north side of the Thames is completed, and the sewage is diverted from the stream, and conveyed to its outfall at Barking Creek, we have an invaluable fertiliser in a manageable form, pumped up to a sufficient level to command the distant sea-shore of Essex. From this point a company has been formed to distribute it. Their Act entitles them to take the foreshores of Foulness Island and also of the Dingie Flat. To these areas the metropolitan sewage is to be conducted by a main and a branch conduit. Already a farm near Barking Creek,

in the hands of the company, is under cultivation, and irrigated by the sewage-manure, and we are informed that heavy crops of Italian rye-grass have been cut. We know nothing of the company, but we heartily hope that their scheme will succeed, inasmuch as the perfect utilisation of the metropolitan sewage will at once assure the authorities of all other towns in the kingdom of the valuable refuse which they have at their command. The Metropolitan Board, on the behalf of the ratepayers, are to receive, after a certain term of years, half the profits. This is as it should be. The sewage is a valuable property, to be realised and distributed equally over the metropolitan area, instead of a nuisance to be got rid of. We have no doubt that fifty years hence Professor Way's estimate of its value will be greatly augmented. We hear that the authorities of Antwerp, with a population of 80,000, obtain £40,000 a year for their refuse dust. According to this rate, the metropolitan dust ought to be worth a very large sum; and the joint return from it and the sewage will ere long be sufficient, we may hope, to pay a great portion of the local rates.

We will now draw attention to a discovery, the credit of which belongs wholly to our French neighbours, and which is one of the most singular in the history of agriculture. Sheep draw from the land on which they graze a considerable quantity of potash, much of which is ultimately excreted from the skin with the sweat. It was pointed out by Chevreul that this peculiar potash compound ("suint") forms no less than one-

third of the weight of raw merino wool; while, of ordinary wools, it constitutes about 15 per cent. of the fresh fleece. As the "suint" may be extracted by mere immersion in cold water, it is easy for the wool manufacturers to produce more or less concentrated solutions from which the potash may be recovered by appropriate treatment. The development of the new industry is principally due to MM. Maumené and Rogelet, and their process is probably in operation at most of the great seats of the wool manufacture in France. The plan adopted by these gentlemen is a very simple one. They evaporate the solutions which are sent to them until a perfectly dry and somewhat charred residue has been obtained. This is placed in retorts and distilled, very much in the same manner that coal is distilled at gas-works; and the result is that, while much gas is evolved, which can be used for illuminating the factory, and much ammonia is expelled, which can be collected and utilised in many ways, there remains a residue, which chiefly consists of carbonate, sulphate, and chloride of potassium. These three salts are separated by the usual method, and then pass into commerce. Curiously enough, they are remarkably free from soda.

The wool manufacturers of Rheims, Elbœuf, and Fourmies annually wash the fleeces of 6,750,000 sheep; and the amount of potash, reckoned as carbonate, which these fleeces would yield, if all subjected to the new process, represents a value of £80,000. But MM. Maumené and Rogelet calculate that there are seven

times as many sheep in France as are included in the above estimate; and this will enable us to judge of the enormous loss in potassic constituents which the soil of an agricultural district has to suffer. The practical and very obvious moral supplied by these facts does not yet appear to have penetrated the mind of the British farmer. Nevertheless, we owe a duty to the soil, and the neglect of it may almost be considered as a crime.

Gas-tar, and ammoniacal liquor from the gas-works, not many years ago formed one of the most repulsive nuisances known to manufacturers. It was either thrown into the river, where it floated in ghastly blue patches, under the name of Blue Billy; or, as at Edinburgh, was conveyed away stealthily at night and emptied into the sea. These offensive products have within these last few years been distilled and transferred into a number of liquids and solids, all of which are more or less valuable. The gas-tar, a material with soiling powers unequalled, and with an odour that is unapproachable, yields benzole, an ethereal body of great solvent powers, which forms the principal constituent of "benzine," the most effectual remover of grease stains known, and generally used to renovate kid gloves. Benzole produces, with nitric acid, nitrobenzole, a body resembling in odour bitter-almond scent, which is largely employed in perfuming soap. Could any two products appear more antagonistic to the substance from which they spring? From the same tar we have various mixtures of substances

chemically similar to benzole. These are popularly known as "naphtha." One liquid of this kind is the gas-substitute of the peripatetic costermonger and cheap Jack, besides being the source of illumination of many large factories and yards in which night-work is done. Another of them, mixed with turpentine, is at once elevated to the dignity of the drawing-room, where it appears in the table-lamp as camphine. Naphtha is also frequently used in dissolving resin, india-rubber, and gutta-percha. Lampblack is made by burning, with slight access of air, the least volatile components of gas-tar. Moreover, if these be melted and mixed with pebbles, a valuable paving material is produced, with the appearance of which most of us are familiar. Red dyes, but, unfortunately, of only ephemeral beauty, can be made from that once dread enemy to the gas manufacturer, naphthaline. The singular thing is that, when distilled at a lower temperature than is required to form gas, oil comes over in which is comparatively much paraffine. It is not, however, from coal, but from certain shales, that the most abundant yield of paraffine is thus obtained. This beautiful, white, and crystalline product has been applied to several purposes. When mixed with about 2 per cent. of stearine, excellent and very cheap candles can be made of it. Melted with a little oil, it furnishes, as Dr. Stenhouse has shown, the best waterproofing agent, perhaps, that we possess. It may also be turned to good account as a lubricant for machinery; and, lastly, it is an essential ingredient in "paraffine oil,"

the manufacture of which has acquired, during the last decade, such gigantic proportions. The watery tar-liquor contains ammonia, very extensively used in the arts. If the ammonia produced in coke-making could be saved, as proposed by Dr. Lyon Playfair, it would be a great gain to agriculture, as from the million tons of coke annually made in England at least sixty tons of sulphate of ammonia that is now wasted could be utilised. Mr. Crace Calvert, in his paper read at the Society of Arts, referring to hydrochlorate of ammonia, pointed out that originally the only source from which it was procured was a district in Egypt, where it was obtained in the form of sal ammoniac, by heating in glass vessels the soot which had been produced by the burning of camels' dung. Now, by the aid of science, we can obtain it from a score of sources without going so far for it at charges so costly; and one of these sources is the watery tar-liquor to which we have just alluded, which yields crude sal ammoniac when evaporated with hydrochloric (muriatic) acid. We had forgotten to mention that among the light oils of tar were some which, mixed with the heavy oils, are very effective in preserving wood from rotting, and a very singular product called tar-creosote, or carbolic acid, which is one of the most remarkable antiseptics in existence, and is evidently destined to play a great part in the world. In the last visitation of cholera to London, thousands of gallons of carbolic acid were used to disinfect the courts and alleys of the City; and, according to some experiments of Mr. Crookes, the cattle-

plague itself promises to succumb to this remarkable agent.

The by-products of gas-works are now so valuable that factories are actually set up beside them for the purpose of working them up. On Bow Common a company, under the name of the Gas Products Utilising Company, is thus located beside the Great Central Gas Company. Many of the products mentioned above are made here, besides others, the most important of which is alum. This product, like sal ammoniac, once came at a great cost from Egypt, but is now mainly procured from an aluminous shale, which forms the roof of coal-mines, and which has to be brought to the surface before the coal can be gained. This was for a long time a perfect refuse material, covering acres of ground, like the spelter and cinder heaps, but chemistry has found it out, and is now converting it into the product which is so valuable to our dyers and calico-printers. This product is made at the works we have mentioned by setting fire to the shale—the carbon and sulphur it contains being sufficient for that purpose—and treating the friable porous residuum in iron pans with sulphuric acid, to which is added the ammonia from the gas-liquor, and the three bodies combine with water to make common or ammoniacal alum.

When one goes over this remarkable list of materials called forth by the aid of chemistry from the homogeneous-looking substance, coal, one almost wonders when they will come to an end: from the black material they issue forth like the prisoners rising from the

gloomy doorway of the prison-house in *Fidélia*, and like them they come forth to liberty, to enter into new combinations. We may mention that from one of the products of the coal distillation made at this factory at Bow is prepared the impure muriate of ammonia in crystals, to which we have already referred; and in order to work up this salt into the "sal ammoniac" of commerce, a chemical firm has built a factory adjoining. Thus three laboratories, placed side by side, pass on from one to the other products which, in the passage, suffer transformations quite as remarkable as any that we read of in Arabian story.

Another material which was for a long time considered a noxious refuse in the old method of manufacturing Price's patent candles from palm-oil is glycerine, a colourless, inodorous, sweet, syrupy body. The object in the manufacture of the candles made from this oil was to eliminate this substance, which obstructed the steady burning of the candle, and caused an unpleasant smell when the charred end of the wick gave forth smoke. By the process now adopted, steam at a temperature of 550° to 600° Fahr. is introduced into a distillatory apparatus containing a quantity of palm-oil. The neutral fats and oils act chemically on the steam, forming fatty acids and glycerine, both of which are then distilled together into a receiver, when the condensed glycerine, being of a greater specific gravity than the fatty acids, sinks below them, and is easily filtered away. Formerly this glycerine passed off into the Thames as a refuse substance: in this manner,

when the Belmont Works were making their full supply of candles, this useful material escaped to the value of £400 per week! Glycerine is very valuable in certain skin diseases and ear affections, and it is found to be an admirable means of preserving all perishable matters, meat and fish being kept in it for months perfectly fresh.

The value of scientific knowledge in the production of materials involving large commercial interests is especially exemplified in this happy discovery. In many trades the by-products alone give the profit in these days of keen competition, and the abler the chemist who presides in such establishments, the more these by-products are likely to be remunerative. The rule of thumb which has so long obtained, will no longer avail us now that we have to compete with the able and scientific manufacturers of France, Belgium, and Germany.

Perhaps no refuse of any manufacture, with the exception of those of alkali-works, has such a prejudicial effect upon both animal and vegetable life as the vapours given off in the process of smelting copper. Those who have visited the Vale of Neath and the country around Swansea know to what a desolate condition vegetable life is reduced for miles by the escape of these fumes in an easterly direction. Edward Vaughan, Esq., of Rheola in the Vale of Neath, writing in September, 1865, to the *Times* respecting this nuisance, says:—

“I lately sat upon a committee for the new assessment of tenements to poor and county rates in Glamorganshire. The valuation of hundreds of acres in the neighbourhood of Swansea had to be

reduced one-half, as young stock cannot be reared at all, and cows and horses kept upon the grass soon die of salivation. I reside seven miles from any copper-works: even at that distance the smoke reaches me; and, finding that a large wood of five hundred acres was pining, I sent specimens of it to one of the most eminent analytical chemists in London; the reply was, that 'the specimens gave sulphuric acid, and recognisable quantities of arsenic.' I calculate that the surface of more than twenty thousand acres of land in the neighbourhood of Swansea and Neath is now undergoing a gradual process of destruction."

Mr. Vaughan commenced an action against the governors and company of the copper-miners of England, which consists of not more than half-a-dozen persons, to abate the nuisance, and they have agreed to do so in a couple of years. Mr. H. H. Vivian, of the Hafod Works, is the only copper-smelter who has ever taken any steps to arrest the deleterious fumes which are doing so much damage; and now we understand he has, by the adoption of a calcining furnace invented by Mr. Gerstenhoffer, partially succeeded: at least two-thirds of the sulphurous acid gas given off in the calcining process are converted into sulphuric acid, to the amount of thousands of tons a week, and in this form is utilised in making superphosphates. As we have before pointed out, there seems to be some element really retributive and curative in the process noxious works have to go through. As in the gas factories the most repulsive smells and the most unsightly and soiling refuse yield the most delicate essences and the most charming dyes, so in these copper-smelting works which destroy vegetation a by-product is yielded which, in conjunction with bones, makes one of the best fertilisers known.

Scarcely any fumes are perceptible from the tall chimney-stack which conducts the smoke above the neighbouring hills. The arsenic, being more easily condensable, is caught in the roasting flues, and is regularly collected. If it is found that the evil complained of should not be remedied by these steps, which the other smelting firms are narrowly watching, in all probability copper-works will be brought under the provisions of the Alkali Works Act, as it is unbearable that, for the profit of a few gentlemen, a country as large as many a German principality should be reduced to a condition of sterility.

Let us for a moment turn from this desolate scene to a more attractive subject,—from the fumes that destroy life to Arabian odours that render it attractive. To chemistry, modern perfumery is perhaps more indebted than any other art that conduces to the luxury of life. Nearly every article of the toilet-bottle or the *sachet* is made from waste, sometimes from most inodorous matters. It is generally supposed that all the essences of flowers are produced by distillation: this is far from being the case; some of them would be seriously injured by such a process, and are caught and fixed, as it were, by what may be termed a fat-trap. In the flower season at Cannes, plates of glass are thinly covered with clarified inodorous fat; upon or under this fat the flowers are placed, and the power this substance has to absorb and retain perfumes is astonishing. On these sheets of glass the most delicate odours are thus fixed, almost as securely as, on the

collodion-prepared plates, the most delicate pictures are retained. In this way the jessamine, the violet, the tuberose, and orange perfumes travel across France, and arrive here as pure as the day they were given forth from the flowers themselves. The emancipation of the odour from its imprisonment is very simple: the fat cut into small cubes is placed in spirits of wine, and the delicate essence immediately deserts the coarse fat for the more spiritual solvent. It may not be quite correct to speak of these odours as waste matters, because the flowers are grown for the purpose of their production, and for that only, but there are many fragrant airs which now go to waste in our gardens that may be secured with a little trouble. Mr. Piesse, in his interesting work on perfumery, says that, "whilst cultivators of gardens spend thousands for the gratification of the eye, they altogether neglect the nose. Why should we not grow flowers for their odours as well as for their colours?" and we may add that ladies may utilise some of our own waste garden perfumes very easily, and with pecuniary advantage to themselves. Heliotrope, the lily of the valley, honeysuckle, myrtle, clove pink, and wallflower perfumes, such as we get in the shops, are made-up odours cunningly contrived from other flowers. Yet they may be made pure with a little trouble. "I want heliotrope pomade," says Mr. Piesse in despair; "I would buy any amount that I could get." And the way to get it is very simple. If there is a glue-pot in the house, and it happens to be clean, fill it with clarified fat, set it near the hot-

house fire, or any other fire, just to make the fat liquid, and throw in as many heliotrope flowers as possible ; let them remain for twenty-four hours, strain off the fat and add fresh ones, repeat this process for a week, and the fat will have become a *pommade à la heliotrope*. The same process may be gone through with all the other flowers mentioned. A lady may in this manner make her own perfume, and we may add, in the words of Mr. Piesse, "one that she cannot obtain for love or money at the perfumer's." The same gentleman, in a letter to the *Society of Arts' Journal*, draws attention to the fact that flowers of great value are a real waste product in our colonies. "In Jamaica, St. Helena, and many other places, orange-blossoms and jessamine flowers are very abundant, but no effort is made to save or economise their fragrance, although the ottos procured from them are nearly as valuable as gold, weight for weight, and for these England pays pretty dearly to France and Italy."

Some of the more delicate perfumes are entirely guiltless of ever having had their homes in flowers ; indeed, they are made by chemical artifice—concocted, in short, from oils and ethers, many of them of a most disgusting kind, the by-products and refuse of other matters. Professor Lyon Playfair, in a lecture delivered in 1852, referring to the Exhibition of the preceding year, says :—

"Commercial enterprise has availed herself of this fact, and sent to the Exhibition, in the forms of essences, perfumes thus prepared.

Singularly enough, they are generally derived from substances of intensely disgusting odour. A peculiarly fetid oil, termed 'fusel' oil, is formed in making brandy and whiskey. This fusel oil, distilled with sulphuric acid and acetate of potash, gives the oil of pears. The oil of apples is made from the same fusel oil by distillation with sulphuric acid and bichromate of potash. The oil of pine-apples is obtained from a product of the action of putrid cheese on sugar, or by making a soap with butter and distilling it with alcohol and sulphuric acid, and is now largely employed in England in the preparation of pine-apple ale: oil of grapes and oil of cognac, used to impart the flavour of French cognac to British brandy, are little else than 'fusel' oil.

"The artificial oil of bitter almonds, now so largely employed in perfuming soap and flavouring confectionery, is prepared by the action of nitric acid on the fetid oils of gas-tar. Many a fair forehead is damped with the *huile de mille-fleurs*, without knowing that its essential ingredient is derived from the drainage of the cowhouse! The winter-green oil imported from New Jersey, being produced from a plant indigenous there, is artificially made from willows, and a body procured from a distillation of wood. All these are a direct modern appliance of science to an industrial purpose, and imply an acquaintance with the highest investigations of organic chemistry. Let us recollect that the oil of lemon, turpentine, oil of juniper, oil of roses, oil of copaiba, oil of rosemary, and many other oils, are identical in composition, and it is not difficult to conceive that perfumery may derive still further aid from chemistry."

Dyes, like perfumes, are often derived from the most repulsive sources: gas-tar gives the magenta and mauve so fashionable of late; picric acid from the same source produces orange and yellow tones. The beautiful colour, ultramarine, was formerly made of lapis lazuli, and was far too precious an article to be used by the calico-printers, but the modern chemist, having discovered the elements of which it is made, now builds it up artificially. This is one of the most striking results of scientific knowledge, and was probably the first triumph of synthetical chemistry. The costly pigment that we treasured up is now made

artificially at 1s. per pound! The method of applying it to cloth is very ingenious. As it is insoluble, how was it to be made to adhere to the material? Chemists answered the question by mixing it with albumen, which, coagulating by heat, fixed it firmly on the fabric to which it was applied. The waste heaps of spent madder were formerly a great nuisance, and were often thrown away, of course into those great carriers—streams and rivers; hence the water in the neighbourhood of dye-works was always polluted; it is now found that at least one-third of this hitherto waste product can be saved by being treated with a hot acid. Prussian blue is made from pieces of horse-hoof, or refuse woollen material, by fusion with iron and alkali. A few years ago the scientific world was startled by the announcement that means had been arrived at of extracting the green colouring matter (chlorophyle) from grass, leaves, &c. To utilise the bloom of spring was indeed a daring idea, and by no means impossible of accomplishment; but that excellent intention has been baffled by the extreme alterability of the colour in question.

The refuse vitreous product of smelting furnaces, which is more commonly known under the term “slag,” is produced in such prodigious quantities, that few people who have travelled can have failed to observe the manner in which it encumbers the ground in the neighbourhood of large iron foundries, where, indeed, it rises to the dimensions of high hills, and often covers many acres of ground. The manner in which

it is going on increasing ~~is~~ very extraordinary ; not less than eight million tons a year are produced in Great Britain alone. If any use could be made of this waste, the profit to the iron-master would be great ; for, independently of the room it takes up, the cost of removing it is never less than 1s., and sometimes amounts to 3s., per ton. Of course many attempts have been made to turn it to account, but hitherto without much success : in the neighbourhood of iron foundries are walls built of slabs, with bevelled coping-stones cast in this material, and they appear to be indestructible, but those we have seen are too ugly in appearance, being rough and black, to gain the attention of the architect ; yet there seems no reason why the material may not be improved and used ornamentally in building. An American gentleman some few years ago took out patents in various countries for its application to ornamental purposes, but he proposed not to take the slag with all its impurities as it comes from the furnace, but to refine and purify it, and, if necessary, to impart to it different colours. Slag is, in fact, very like lava, and is allied nearly to the rocks of igneous origin which form our most durable building stone. But granite itself is far below purified slag in density and powers of resistance to crushing ; this substance, indeed, bears six times the pressure of the black marble of Italy, one of the hardest building materials ever used. When purified from mechanical mixtures, slag will run into moulds and take delicate impressions, which render it very valuable for all kinds

of ornamental work. The vitreous nature of the material makes it particularly applicable for building purposes in all places where moisture has to be encountered; every common brick, it is well known, takes up one pound of water, whereas these slag-made slabs are impervious to wet, and are almost indestructible. Some tiles made of this material were laid down in the Place de la Bourse, in Paris, some years since, and may be there now for what we know to the contrary.

Perhaps the most important refuse product that can be mentioned as proceeding from a systematic manufacturing process is that known as "soda waste." Large quantities of this substance are rejected as useless by most alkali works; and it has been for many years at once a problem and a reproach to chemistry. The magnitude of our loss may be imagined, when we reflect upon the fact that almost the whole of the sulphur employed in making washing soda is removed, in chemical combination, as a constituent of this waste. Such a circumstance did not, of course, escape the attention of scientific men; and many methods, some of them extremely ingenious, were devised for the recovery of the sulphur. All of these, though succeeding completely from a chemical point of view, shared in one important defect,—they did not pay the manufacturer. The offensive heaps, therefore, continued to be a most serious local annoyance, by evolving foul and injurious gases, and were a source of litigation until, within only the last few years, the final removal of the

nuisance was satisfactorily accomplished, and declared to be a profitable undertaking. The processes in actual employment would not be understood by a non-technical reader; but we may state that none of them involve the introduction of any material which the works themselves do not at present furnish. France has, perhaps, taken the lead in this matter; but several English manufactories are busy, and successful, at the new processes. Some of the sulphur thus prepared was shown at the last Exposition in Paris; but much of it is converted into hyposulphites, another form in which it has been several times exhibited. Both the sulphur and hyposulphites thus produced are now made on a very large scale, and the recovery is complete. We may, then, congratulate ourselves on having witnessed this important and, indeed, necessary victory.

The utilisation of the waste food of South America, if it could be accomplished profitably, would be the greatest possible boon to the poor. In the vast prairies of America, extending from the Mississippi to the Missouri, bisons roam freely in droves too large for the eye to compass, but certainly numbering many hundred thousand beasts. In the Pampas of Buenos Ayres the wild oxen are at present slaughtered at the rate of 400,000 annually for their hides and skins, the flesh being an absolute waste, civilisation not having yet arrived in these regions at the simple process of cutting the flesh into long slips, and then drying it in the sun, in which form it comes from the River Plate to the Southern States of America, and is there eaten

by the negro population in the form of jerked beef. In Moldavia and Wallachia there is an abundance of ox flesh wasted, the immense herds of this quarter of Europe being slaughtered simply for their fat and horns. Some of this beef, and some also from Australia, has come over to this country in hermetically-sealed cases, and capital food it is, much better than the salt junk upon which we used to feed our navy, but it has not yet made a footing among our population, although it can be sold in London at sixpence a pound.

Mr. Simmonds, in a paper contributed to the *Journal of the Society of Arts*, in speaking of the vast sources of unutilised food that exist in different quarters of the globe, states that the quantity of animal matter wasted in the Newfoundland cod-fishery is 120,000 tons annually. Surely, if none of this can be secured for food, it may be made available for some other useful purpose. Professor Way has, we understand, prepared a manure from refuse fish which contains a very high percentage of ammoniacal salts and phosphates of lime. We are told, indeed, that the guano islands will be exhausted by the year 1888, or thereabouts, and if in the meantime we have not brought our own sewage into use, our agriculturists will be sorely pressed for a powerful fertiliser. The enormous number of horses in Buenos Ayres renders them of little commercial value; but it is certainly odd to hear that the number of mares slaughtered in that country merely for their hides and grease is so great that it is found economical to light the city of that name with gas made from the

fat of these animals. Again, Mr. Simmonds tells us that from 18,000 to 20,000 elephants are killed annually to furnish the ivory used by the Sheffield manufacturers. Elephants' flesh is very good; and the late Mr. Gordon Cumming spoke rapturously in his volumes on African travel about the delicacy of elephants' feet; not that we think it likely the flesh of these animals will ever come into use among ourselves, or that we shall ever benefit by the superfluity of green turtle to be found in the bays of the Bonin Islands, where they are so numerous "that they quite hide the colour of the shore, and many are from 3 to 4 cwt. each." Possibly, if we cannot bring the turtles to our aldermen, in times to come our aldermen may make trips to this turtle paradise. But there is no knowing what science may do for us, even with respect to preserving all this superabundant flesh and green fat. Who would have dared to predict five-and-twenty years ago that pine-apples would be sold about the streets at 6*d.* each, and would become as familiar to our street *gamins* as apples?

Among the more curious examples of the use of refuse we may mention that album græcum is collected from the dog-kennels, for the purpose of cleansing the pores of goat-skins previously to their being tanned for morocco leather. As many as fifty people, we are told, whose wages are not less than £5,000 a year, are employed in collecting this substance in the metropolis. The production of albumenised paper for the purposes of the photographer consumes a large number of the whites of fresh eggs, and consequently the yolks for a consider-

able time were considered a waste substance. In France, where they are very quick at utilising any refuse matter, a maker of "colifichets"—those yellow-looking, unsubstantial articles, whether food for man or bird the Briton is at a loss to make out—was some years ago suddenly enabled to cut out all the rivals in his trade by the low price at which he sold them. After a little time the mystery came out: these "colifichets" are made principally of the egg-yolk, and to provide this ingredient the clever Frenchman had made a contract with all the principal photographers for the cheap purchase of this refuse of their profession. In England the confectioners now obtain this substance from the same source. There must be a great abundance of it in the market, and in consequence cheesecakes ought to be cheap; at all events the price should depend upon the fluctuations of personal vanity. When there is a great run upon the photographers, in fine weather, there ought to be a decline in this particular delicacy. Old and spoiled photographs themselves are a very valuable waste, in consequence of the amount of gold and silver they contain, which is recovered by simply burning them, and from the washings of the prepared paper they are secured by evaporation. The quantity of refuse silver thus recovered amounted in one large photographic paper establishment to £1,000 in a year. Every refuse of the precious metals is most carefully collected. A jeweller's leather, old and well worn, is worth a guinea; and what are termed "sweeps," or the dust collected in the leathern receptacle that is suspended

under every working jeweller's bench, is a regular article of trade. A worker in the precious metals can always obtain a new waistcoat for an old one, in consequence of the valuable dust adhering to it. Bookbinders doing a large business tell almost incredible tales of the amount of gold they collect from the floors and the rags of the binders.

To the literary world the utilisation of some waste or undeveloped substance, as a substitute for, or aid to, rags in the manufacture of paper, must be a matter of great interest; for, whilst many sources from which we once procured rags are now cut off, the cheap literature of the country has increased the demand in an extraordinary degree. The reduction of the stamp duty has enormously augmented the sale of newspapers, and the paper-makers have consequently long been at their wits' end to find some new material suitable for paper-making. In looking over the patents that have been taken out during the last twenty years for such fibres for this purpose, it is impossible to avoid being struck with the number that have been put forth as suitable. Wood-shavings, nettles, hop-bines, bindweed, the barks of various trees, in fact, every material of a fibrous nature that will pulp, has been proposed and eagerly supported. Among all these, two only have come before the world commercially—straw and esparto. The former cannot be called a waste material, inasmuch as it is already extensively used for a variety of purposes; therefore any new demand upon it must certainly end in considerably increasing its value, and therefore in

withdrawing it from many uses to which it is at present applied. It cannot be denied, however, that it makes a very good manuscript paper; but for books and newspapers the amount of silica it contains renders it very brittle. The *Morning Star* is or was printed upon it, and it is more or less in demand; but the paper-makers tell us the trade do not like it, and they have long been eager for some more tenacious substance. This they appear to have at last obtained in esparto. In looking back at the list of patents we find that this substance was made the subject of one in 1852 by Jean Antoine Farina, and again in 1854 and 1856 by James Murdock and Thomas Routledge. Indeed, the French Government, previously to the earliest of these dates, had its eye upon this useful grass as a substitute for rags; specimens of it, and also of paper made from its fibre, were to be seen in the Algerian section of French products in the Exhibition of 1851. The *Akhbar* daily paper has been printed in Algiers for years upon it, and it was introduced to the whole world in the "Exposition" of last year—the catalogue of which is printed upon paper made from esparto alone. The grass known to botanists by the name of *Stipa* (or *Macrochloa*) *tenacissima* grows wild upon both sides of the Mediterranean, for about five degrees of longitude. It comes, on the European side, from the east coast of Spain, principally from Carthagena, Almeria, Aquelas, &c., where it has long been used for making mats, ropes, soles of sandals, and the Iberian scourges of Horace (Epod. iv.); and it appears that any quantity

of it may be obtained from Algeria, where it is a most abundant weed. We have by us at the present moment a bundle of this weed, sometimes miscalled broom, some pulp, and some paper made from it. It is white and very tenacious in fibre, and we hear that, after rags, it is certainly the best material yet discovered for the making of paper. The favour in which it is held by the British paper-maker may be gathered from the fact that between 65,000 and 70,000 tons of this broom were imported into this country for paper-making purposes in the year 1866. It was imagined that in the opening of the China trade large supplies of cotton refuse would be obtainable from the teeming population of that country, but it was soon found that all old rags in that provident empire were used up in making the thick soles of boots.

Within the limits of this article, of course, it is only possible to touch upon the more important examples of the use of refuse. There are, doubtless, many that we have omitted to mention, that might have been included with advantage; but we have given examples enough to show that civilisation is every day adding enormously to the useful products of the world, both by economising her resources, and by calling new ones forth by the aid of chemistry. In conclusion, we may allude to one matter which concerns us as a manufacturing nation most nearly. Shall we ever discover, and be able to utilise, new combinations of the forces of nature? Mr. Babbage thinks so; and however much practical men may regard this as a philosophical dream, it should be remembered that the dream of one

age is not unfrequently the reality of those which succeed. When Franklin drew electricity from the clouds by means of a kite-string, he would hardly have dared to hazard the prophecy that in the next century a string of copper, stretched under the ocean, would form the tongue of two distant nations. If coal should fail us, as many people believe will be the case after the lapse of a few centuries, we shall have to fall back upon the more directly exerted forces of nature, among which are the rise and fall of the tides, and the tremendous manufactories and warehouses of heat that are situated in volcanic mountains. Mr. Babbage, in his "Economy of Manufactures," makes a forecast respecting the possible sources of such power, and the method by which it may be exported by the aid of another waste material, namely, ice. The following paragraph gives us a notion of what may be in the future a gigantic use of that which at present is not only a refuse, but sometimes a very mischievous power :—

"In Iceland the sources of heat are still more plentiful ; and their proximity to large masses of ice seems almost to point out the future destiny of that island. The ice of its glaciers may enable its inhabitants to liquefy the gases with the least expenditure of mechanical forces ; and the heat of its volcanoes may supply the power necessary for their condensation. Thus, in a future age, *power* may become the staple commodity of the Icelanders, and of the inhabitants of other volcanic districts ; and possibly the very process by which they will procure this article of exchange for the luxuries of happier climates may in some measure tame the tremendous elements which occasionally devastate their provinces."

This is indeed a tremendous prophecy ; but did not the Greeks anticipate Mr. Babbage when they made Etna the forge of Vulcan ?

WINE AND THE TRICKS OF THE WINE DEALERS.

THOMAS CAMPBELL the poet was wont to relate that, in the days of his grandfather, the inhabitants of this northern corner of Britain, not yet reduced to degeneracy and corn-spirits by wine duties and the Union, "fenced in garden, field, and paddock with claret staves." The comparative use or disuse of wine in countries which do not produce it, is one of the most curious and striking examples of the power exercised by fiscal legislation over the habits of society. One of the great products of nature and necessities of life may either be supplied in abundance to every part of the world by free trade, or restricted by taxation and bad laws, until it comes to be regarded as a luxury and doled out like a medicine. For a century and a half wine has ceased to fill its proper place in England ; it is even now almost unknown to the mass of the people ; the average annual consumption per head had sunk to a bottle and a half ; and thus the richest nation on the globe had contrived, by self-imposed laws, to deprive itself of the noblest and most healthful beverage that exists. Nay, worse, the pernicious effect of these laws has been, that the article consumed and imported as

wine ceased to be wine at all, and became something else ; and that the people of England, when they spoke of wine, applied the term to liquors in which the honest juice of the grape had but a small part. Under these duties England became the smallest wine-consumer in the world ; her wine was dear, her wine was bad, and above all sophisticated, until it had lost all the best original qualities of its nature.

Such was the state of the wine trade, and of our cellars, when the negotiation of the Commercial Treaty with France, so ably conducted by Mr. Cobden, brought the question to a prompt solution. It had previously been thoroughly ventilated by the Select Committee on the Wine Duties of 1852 ; and in order to carry into effect the provisions of the French Treaty, Mr. Gladstone recommended Parliament to reduce and readjust the duties on wines and foreign spirits. His first proposition, on the 10th of February, 1860, was to reduce the duty on brandy from 15s. per gallon to 8s. 2d., the colonial duty. The duty on all wines in bottle, of whatever strength, and on all wines having 26° and upwards of proof spirit, was to be 2s. per gallon ; on wine having 15° and under 26° of proof, 1s. 6d. per gallon ; and on wine less than 15°, 1s. per gallon. The maximum of 40° proof, beyond which no liquid was to be admissible as wine, remained unaltered. It was soon found, however, that this graduated scale of duties was extremely unpractical and inconvenient. A further change was made in July, 1860, when the duty on brandy was raised to 10s. 5d.

per gallon ; and in 1862 the wine duties were fixed at 1s. per gallon on all wines below 26° of strength ; 2s. 6d. on wines from 26° to 42°, and on all wines in bottle ; from 42° to 45°, 3d. per gallon extra, and above 45° the duty on mixed spirits is charged. In 1866 the distinction on wines imported in bottle was abrogated. This was the first attempt to give what are termed the "light wines" a chance in the British market. Before this bold stroke of the then Chancellor of the Exchequer, all but the highest-priced wines of France and Germany were practically excluded from our market by the fiscal barrier of a 5s. 9d. duty per gallon, which in many cases was several times the value of the wine itself. Consequently the moderately-priced natural wines of Europe never reached the tables of our middle classes, and it was only when they took their holiday trip abroad that they became practically aware of the fact that in many parts of the Continent wine was as cheap as beer—nay, sometimes as cheap or cheaper than water. It certainly was a shock to their preconceived notions that what they had been accustomed to look upon as a luxury, other nations at their very doors treated as a necessary of life. It was predicted by the old-fashioned wine merchants, that the Liberal Chancellor of the Exchequer's policy would not succeed ; that the people of this country would not drink the poor sour trash that satisfied our friends across the water ; if they took wine, they would have wine such as the full-bodied vintages to which they had been accustomed. In short, any stone that was at hand was

cast at the policy of the statesman who, following in the steps of his great leader, completed the gift of cheap bread with cheap wine.

Like many other predictions inspired by interested motives, these have already, within eight years of the time when they were made, totally and signally failed. Taking the wines of France as the typical natural light wines of Europe, the start they have taken since the inauguration of the new policy is perfectly astounding. In the year 1859, under the old duty of 5*s.* 9*d.* per gallon, we imported the very moderate quantity of 695,913 gallons, but in 1867 the quantity had increased to 3,923,169 gallons, showing an enormous augmentation in the eight years on French wines alone. If the increase should go on at anything like the same rate, the revenue, instead of suffering a loss, will very speedily more than recover itself. Indeed, we anticipate that when the other natural vintages of Europe become better known, and find their way here, the new low wine duties, like the penny post reform, will yield an increasing return to the Exchequer.

By the light of this successful experiment, the reader may see the meaning of the abundance of claret staves that a century and a half ago formed so useful an item in Scottish agriculture. Two hundred years ago claret was the wine of the country—as indeed it has been of other countries in northern latitudes up to the present time—and probably would have remained so, were it not for the fiscal burdens placed upon it by the Government towards the latter end of the seventeenth century.

In the year 1669, when the duty on all wines was only 4*d.* per gallon, 20,000 tuns of French, and 25,000 of Rhenish, Portuguese, and Spanish wines were imported into this country, making a total of 45,000 pipes, when the population was only five millions. In those days all classes but the very lowest were familiar with the cup of pure wine, which we may truly say "cheers but not inebriates," and it flowed at the taverns just as bitter beer or gin does now ; it was the daily drink of all conditions of men of even moderate means ; at the meal it was taken as a beverage, and not merely as a *bonne bouche* at dessert, or for the purposes of intoxication, as in the dull Hanoverian or Georgian era.

In 1678 the duty was doubled, and successive additions were made until the year 1697, when the first step was taken towards the imposition of a differential duty on French wines in favour of those of Portugal. The Methuen treaty of 1703 gave the final blow to the light wines of France, much to the disgust of the wits of the period, who poured all the vials of their wrath upon the strong sweet port they were forced by British statesmen to drink instead of the light exhilarating claret. We can only realise to ourselves the absurdity of this forced change of beverage by fancying a modern Chancellor of the Exchequer putting a duty on beef and mutton for the encouragement and protection of pork.

Claret was, however, drunk in Scotland to a much later date ; in fact, the restriction which obtained in England against it by reason of the differential duty did not affect this country until after the Union ; indeed,

long subsequently to that period the smuggling of French wines into the northern part of the kingdom was carried on in the freest manner, every portion of the community winking at the running of cargoes into the numerous creeks and bays which indent the Scottish coast. Home's well-known epigram has been quoted too often to be repeated here; it expressed a national sentiment which has not yet died out; and in justice to the great wine merchants of Edinburgh and Leith it must be added that they have never been wanting in a good supply of claret, superior to any which was drunk in other parts of the island.

The first port wine introduced into this country did not come from the Alto Douro district at all. It was not sweet and strong as we know it, but it had a clarety-burgundy character, very much like some of the pure vintages drunk by the Portuguese at the present day. The fiery potations now consumed under that magic name are the result of a long process of manipulation, of "fortifying," of "colouring," and "sweetening,"—of degrading, in short, good wine to a supposed standard demanded by the British taste, but which has at length resulted in its almost total banishment from refined tables, and its descent to a ruder class of consumers, who have caught up the tastes of the upper ten thousand just where they have left them off. The middle classes, or rather the lower portion of them, have followed suit, and port and sherry have for a long time been the only wines they are practically acquainted with. Both of these wines are adulterated

to an extent few people would believe. Omnibus passengers a year or two ago were startled by seeing advertisements on the roof touching "the pure standard of natural sherry." Why, said every man to himself, is not all sherry natural? How can the juice of the grape be anything but natural? The wine merchant who invented that advertisement was the greatest enemy to the "trade" it ever had, for it set people thinking. Let us see what this natural wine really is. Pure and uncontaminated from the grape, it never makes in Spain more than 28 per cent. of spirit, the average according to Mr. Shaw being but 22 per cent., consequently the lowest cannot make more than 16 per cent.; and as this wine would be selected to make common sherry, from its poverty it would require at least 20 per cent. of spirit to bring it up to the regulation strength. In the case of port wine the addition of spirit is done with a double purpose. As the Englishman is supposed to like a strong sweet wine, the only possible means of obtaining those two antagonistic qualities is to stop the fermentation of the must by the addition of spirit before all the sugar it contains is changed into alcohol: by this means a sufficient quantity of saccharine matter is retained to suit our supposed taste. This artificial wine, so dosed with spirit, is never touched by the Portuguese, nor, indeed, by any nation of Europe excepting ourselves. The true growth of the Alto Douro district would come in under the 1s. a gallon duty, as containing less than 26° of spirit, but it would not be re-

cognised as that wine Englishmen have been accustomed to receive from Portugal for this last century and a half. Hence the outcry of the wine merchants for the admission of all wines containing as much as 42 per cent. of alcohol at a uniform 1s. duty. The reason which weighed with the late Chancellor of the Exchequer for not listening to this demand seems to us cogent enough. A liquid that contains almost as much spirit as the "Cream of the Valley" or the Old Tom one buys over the publican's bar cannot in any strictness be called wine simple and pure. It may or may not be true, as Mr. Oswald Crawford, our Consul at Lisbon, states in his annual Report to the Government, that it would not pay to re-distil this spirit from port wine on its arrival in this country. The distillation of spirit from wine mixed with spirits would be an illicit process, which could not be carried on without great risk of detection by the Excise; and we have before us calculations to prove that the operation could not be profitable or compete in price with cheap German spirits, which can be manufactured for 1s. 6d. per gallon. But Mr. Shaw says in a letter to the *Times* of January 17, 1865, "I see in the *Moniteur Vinicole* of the 24th inst. the description of a wine of the Hérault, dark and strong, containing 24·4 of alcohol, costing 4s. the hectolitre, or 8s. 4d. the hogshead, exclusive of the cask." Now this wine, fortified up to 42 per cent. of proof spirit, could be landed and sold here at £4 12s., or 4s. per dozen, duty paid. In other words, a liquid not much inferior in strength to the

spirituous compounds of the public-houses could be sold at 4*d.* per bottle. The sugar, colouring, seasonings, &c., which would be required to give a bite to such liquor, would be so trifling in value that they have not been taken into account. Here, then, we have a rousing cordial which would only require some taking name to make it compete in flavour and vastly undersell in price many of the decoctions now sold under fancy names at spirit vaults. Hence, it will be seen, these wines, or, as they may be more justly called, mixed spirits, would materially interfere with the Excise duties, by entirely turning the flank of the 10*s.* 5*d.* duty at present charged on proof spirit. It may be denied that any such drams, to call them by their right name, would find favour with the spirit-drinking public; but where there is once a craving for alcohol, the physician knows well that the palate is not very particular. A singular instance of the fact that the presence of spirit in any liquid is sufficient to teach people how to extract it for illegal purposes has been afforded by the discovery, on the part of the Inland Revenue, that wood naphtha mixed with spirits of wine, and known as methylated spirit, which is permitted by the Excise to be used in the arts and manufactures, is disguised with sugar, ginger, fenugreek, and sold under the name of "Indian Brandee," "Pure real Islay Mountain," and, better still, by the name of "the Teetotaller's Night-cap." So that the Excise are by no means so certain as Mr. Crawford seems to be, that wine fortified up to 42 per cent., if

admitted at the 1s. a gallon duty, would not make a serious encroachment upon the revenue. It is, we believe, this consideration which interrupted the negotiation of the Portuguese Commercial Treaty. There is no objection on our part to admit any *wine* at the uniform 1s. duty; but wine charged with a large infusion of corn or potato spirit cannot come under that denomination. The distinction between the two commodities is perfectly clear: wine is the product of vinous fermentation; spirits are the product of distillation. When spirits are mixed with wine beyond the proportion represented by the present line of 26°, which is alleged in some cases to be necessary, it may fairly be regarded as a distinct article, and pay a higher duty accordingly. The English wine merchants affirm that it is absolutely necessary to dose their wines with spirits. In plain terms, we do not believe them; for how comes it to pass that this abominable practice is notoriously peculiar to wines prepared for the English market?

Our quarrel with the dosing of wine with spirit has a much deeper reason than the loss of revenue: it is an intolerable adulteration, and is the mother of innumerable sophistications in other wines, which corrupt our taste and render us the laughing-stock of Europe. Mr. Crawford, when he defends the mixing of large quantities of spirit with port wine, is certainly running counter to the ideas of all intelligent writers upon the wine question, including the late Baron Forrester, whom he goes out of his way to disparage now he is dead. Consul Johnson, writing from Oporto to Lord

Palmerston respecting port-wine adulterations in the year 1850, said : "That the wines of the Upper Douro, if well fermented, need more than a very small quantity of additional spirit, is very doubtful. Certainly good wines sent from Oporto to Brazil keep, notwithstanding the length of the voyage and the heat to which they are exposed, without half so much additional brandy as those qualified for exportation to England contain ;" and he significantly adds, "It is probable that a great part even of this smaller quantity is unnecessary." The most amusing feature of this alcoholic adulteration arises from the fact that we provide the weapon with which we are assailed. Mr. Oswald Crawford talks about the brandy that it is necessary to add to protect the wine, but the Portuguese prefer to use the far cheaper potato spirit, of which we sent them, in the year 1865, 1,465,193 gallons. If 20 per cent. of this cheap neutral spirit is returned to us as port wine, at port wine charges, we see the price we pay for our love of "fortifying" and spoiling what is naturally a fine and exhilarating wine. We are told that even our spirit is too good and too dear for our peninsular friends, and that they are now declining our tolerably pure spirit for the coarse and imperfectly-distilled Prussian beet-root spirit, which can never mix properly with any wine, whatever time may be allowed for the process.

We really do not know what value the Government places upon these Consular Reports. If the Chancellor of the Exchequer frames his Budget upon them, he

must often be sorely puzzled by the diverse statements he receives upon mere matters of fact. For instance, Mr. Crawford, writing in January, 1867, says :—

“The other statement of Mr. Forrester, that port wine was adulterated with treacle, elderberries, and jeropega, was contradicted by every gentleman in the trade at the time he brought the charge—that is, in 1844. It may or may not have been well founded at the time; but it certainly is not the case now. Mr. Forrester says that elderberries gave a taste and smell to the wine quite unmistakable, and a dark purple colour, which is very different from the rosy colour of true port wine. This I understand to be perfectly true; and as the demand for very high colour, as I have said, no longer exists, the statement made to me that only about 1 per cent. of the port wine now made is stained with elderberry, and that wine of a very inferior quality, may be accepted as truthful.”

But Mr. Lytton, her Majesty’s Secretary of Legation at Lisbon, writing at the same date, says respecting this same elderberry adulteration :—

“All port wine hitherto exported for the English market is largely mixed with brandy, and is composed *almost quite as much of elderberries as of grapes*. . . . This is the composition of all the port wine hitherto drunk in England. No pure wine, no wine not thus specially adulterated for the English taste, was allowed by the Government committee of tasters to pass the bar of the Douro for export to England before the year 1865.”

Now, as no connoisseur in port who prides himself on laying down his wine ten years or so before he drinks it can have younger wine than this in his cellar, this statement from her Majesty’s Secretary of Legation is calculated to make him uncomfortable. We are inclined to think ourselves that the Legation has made an over-statement, for if “famous old port,” say of Sandeman’s shipping of the year 1834, is only half elderberries, what a price is paid for a made wine

that no one would touch at home; and what a farce it is to entomb in cobwebs magnums of this liquor, with the idea that it is precious beyond price! When cellars of this old wine are brought to the hammer and fetch 190s. a dozen, we can understand that it pays well to plant hedges of elderberry trees in the wine districts. Mr. Crawford tells us that Portugal exports dried elderberries to Spain and France in large quantities, especially to the former country. We see no reason to doubt it. The trick of adulteration, when it proves so profitable, is very easily caught by other nations. It is at least consolatory to know that Portugal, clearly seeing that her absurd restrictions on the export of wine, originally instituted to enhance the price, like the old coal vend in England, are ruining the Oporto trade, has at last thrown the trade entirely open, hoping to recover by free trade some of the advantages she once enjoyed in the English market. Whatever treaty our Government may enter into with that of Portugal, however, there can be little doubt that port wine will never again enjoy any advantage over the vintages of other countries.

Before we part with port wine we must have one word to say with respect to the absurd price demanded for this wine at hotels. It is never charged in the bill at less than 6s. a bottle; and what the nature of hotel port wine is we all know. A writer in the *Pall Mall Gazette* tells the following anecdote:—

“A friend of mine, who was staying for some time in Reading, where the militia were exercising, had occasion to go into a back-

yard of one of the hotels, where he saw an old crone stirring a black mixture in a huge caldron, which looked like a compound of blacking, blackberries, and sloes, plucked from the neighbouring hedges. 'What are you brewing there, my good woman?' said my friend. The old witch, stirring up the compound with a thick stick, replied naively enough, 'Port wine for the Berkshire militia.' "

The truth is that the two classes of traders who should be most interested in increasing the consumption of wine, hotel-keepers and wine merchants, are precisely those who labour most effectually to restrict it by ridiculous prices and impure wines. We know of cases in which wine costing 6*d.* a bottle at Bordeaux, and exported from thence at that price, has been sold for 6*s.* in an English country inn!

Sherry, like port, as at present drunk in England, is a highly-manufactured article. Mr. Shaw, who now advocates the admission of this highly-alcoholised wine at the low rate of duty, does not give it a very high character in his book. For instance, he says:—

"One can no more drink in Spain the sherry usually consumed in England than they can in Oporto the usual English port. About six gallons of spirit are put into a butt of sherry after fermentation, and generally about four gallons more previous to its being supplied. It is almost quite pale at first. The very dark brown is made at St. Lucar in the following manner:—Twenty or thirty gallons of must (unfermented juice) are put into an earthen vessel, and heated until not more than a fifth part of it remains, when it looks and tastes like treacle. This is turned into a cask containing more must, which causes it to ferment, and the result is a very full luscious wine, which, if originally good, becomes after many years invaluable for giving softness, richness, and colour to others. Large quantities of this product, when new, are used to colour and to cover the harsh thinness of poor qualities. It is for this reason that it is called 'the Doctor,' and many a butt that comes to England to be sold as 'curious old brown,' at an immense price, has to thank the old boiled mosto stocks for its character."

The truth is, that with the exception of the Amontillado, Mantilla, and Manzanilla wines, no pure sherry comes to this country. These wines, as a rule, are imported pretty pure. What gives the peculiar flavour to Amontillado is a mystery that has not yet been solved. We have been told by more than one wine merchant that samples of wine that have been left uncorked have taken on an Amontillado flavour in a most unaccountable manner. In Spain it appears to be a caprice—if we may use so unscientific a term—one cask out of a hundred, with no apparent cause, ripening into the highly-valued flavour. In the Report on the wine duties in 1852, Dr. J. Gorman, who had been long resident in the wine districts of Spain, gave some very valuable evidence touching the making up of sherries for the English market. He boldly stated that “no natural sherry came to this country;” and on the chairman repeating in astonishment, “None at all?” he replied:—

“(5718) None whatever; it rarely happens; no wine house will send it you; your demand is for wine to suit an artificial taste, and you send out your orders, that is, the wine merchants in England; and they confine their exports there to certain marks, numbers, classes, and qualities of wine, and the article you get is a mixed article. (5719) You gave it as your opinion that we get none of the highest-priced sherries? No natural wine; if they gave you the natural produce of Xeres, it would not suit you; in all probability you would say it was an inferior wine; therefore your taste is artificial.”

Again, on being asked—

“(5726) What is the difference between the strength of the genuine wine and the strength of the artificial wine drunk in this country?

If the fermentation be carefully conducted you will have alcohol in proportion to the quantity of saccharine matter contained in the grapes or mosto. The innate or natural alcohol of the wine rarely exceeds 15 per cent. The quantity of natural alcohol which all good cherry wines contain is about 12 per cent. The strength of the mixed wine will depend upon the quantity of the brandy which the exporter may deem necessary to add in addition to its innate strength. (5727) Certain adventitious alcohol is put in to prepare it for the market. There should be none whatever; that is an adulteration."

Now most of the low-priced sherry that comes into our market is fortified up to 42 per cent. of spirit, or 25 per cent. more than is necessary to sustain wine that has been thoroughly fermented. It is absurd to say that properly-fermented wine will neither keep nor travel. The same pretence of not keeping is urged in favour of adulterating other wines besides those of the Peninsula. In paragraph 524 of the Report we have been quoting, we find the following singular corroboration of Dr. Gorman's statement in the evidence of Mr. H. Lankester:—

"Are you aware of the existence of an impression in the trade that there is something in the air of the Thames fatal to the quality of the wines (Greek and Italian), not now imported into our ports, and which prevent their importation? I am aware it is so stated that they are not suitable for the use of this country, *but those wines will go round the world, and do go round Cape Horn and the Cape of Good Hope, and get consumed in Java and other places, but they do not stand coming up the Thames, it is said.*"

We may add, after this decisive evidence, that Greek wines have at length found their way up the river very well, and are found to be in excellent condition afterwards. The Italian Government are putting the matter to the test with their own wines, having ordered that

samples of all vintages shall be placed on board Government ships, and consigned to their consuls abroad, who will report to the home authorities the condition in which they arrive.

But to return to the system of falsifying wines, Why, we ask, should adulteration by spirit be allowed at all? Is it less a falsification than mixing chickory with coffee, a fraud we strictly prohibit? If the evil stopped with the two forms of wine Englishmen have hitherto considered to be the only two worthy of their notice in the wide world, it would be bad enough; but there is the still greater evil behind, that it makes these manufactured wines the standard by which we judge all others. If they are not "hot, sweet, and strong," like these standards, they are nothing. There is, as we heard a Kentish baronet say the other day with a great deal of truth, "*nothing in them.*" *Vin ordinaire* of any country is vulgarly termed "belly-aching stuff," sour trash that will not suit an Englishman. Now, as Dr. Druitt has very truly said, in his Report upon cheap wines—

"That wine, like all drinks used by healthy-grown men, is slightly sour. . . . A certain amount of sourness belongs to all wines, and we have it naked in the well-fermented wines of France and Germany (claret, Burgundy, hock, &c.)."

This question of acidity, or rather we would call it this sub-acid smack, is not in the least understood by the ordinary English wine-drinker; but all chemists and physicians know well that sweetness is but too

often the mask which is artificially put on a favourite wine to hide its natural and wholesome acidity.* Dr. Lankester tells us, in his *Lectures on Food*, that—

“Acidity of the stomach more frequently arises from the decomposition of sugar than anything else; and wines which have sugar enough to cover their acidity have been taken to prevent this state of stomach, whilst acid wines which contain no sugar have been avoided. Neither tartaric, acetic, nor any other acid has a tendency to favour the development of more acid in the system. . . . Sugar hides the flavour of acids; so that a sweet wine may really contain much more acid than an acid wine. It is well known that gout comes on our port-wine drinkers. Port wine contains more sugar than any of the wines ordinarily drunk in England. Sugar alone will not produce this disease, but sugar with alcohol, as in ports and sherries, will produce it. Sugar is found in the same state in beer. Gout is found amongst port, sherry, and beer drinkers; whilst it is almost unknown amongst spirit, claret, and hock drinkers.”

But this natural sub-acid taste our wine merchants will not permit us to acquire. The mixings that take place in the docks and in wine merchants' cellars are so much a matter of course that the trade think nothing of it, but if their own bakers or grocers were discovered adulterating in the same way, they would call them by very hard names indeed. Mr. Cyrus Redding, who has written a very good book upon wine, gives us an insight into the way very common ports are made, which places in the shade the stories told by the late Baron Forrester, and which Mr. Consul Crawford endeavours to explain away. Here is a receipt

* In Burgundy a mischievous practice has gained ground of late years of adding sugar to the wine: the consequence is that wines thus prepared are less likely to stand, and less wholesome than the wines of Bordeaux. But pure Burgundies are not inferior to any wines in Europe, and will support a long sea voyage.

out of the "Victuallers' Guide," which we quote from his evidence before the Wine Duties Committee:—

"Forty-five gallons of cider, six of brandy, eight of port wine, two gallons of sloe stewed in ten gallons of the liquor pressed off. If the colour is not good, tincture of red sanders or cudbear is directed to be added. This may be bottled in a few days. That sells as port in this country? It sells as port. Has it anything of the flavour or appearance of port? I imagine not. It is done at the small public-houses? Many publicans do it, I imagine."

But it is not only the small publicans who play these tricks. All the refuse wine, red or white, old samples, heeltaps of bottles, half-tasted glasses are thrown down and passed away into the collecting-barrel—just as the cook throws any kind of meat and soup liquor into his stock-pot—and with the addition of a little spirit and colouring matter it comes out very good eighteen-shilling port. Mr. Shaw has shown us how "curious old brown sherry" is made already by the aid of "the doctor." Can any one believe that the veritable properties of wine will exist or outlive such treatment as this? As well may the picture-dealer overwhelm the delicate and tender half-tones of a sketch by Copley Fielding by smearing and daubing it over with brown varnish, as we may permit the wine merchant to obliterate the delicate vinous properties that dwell in all pure wines of even tolerable quality by the admixture of such decoctions. It is, we think, very questionable whether wines of different vintages, but of the same country, should be mixed at all, as is now universally done in bond for home consumption. Chemically they cannot perfectly agree, and in order to keep the peace among them more

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alcohol is poured in to play the constable. But there can be no question whatever of the atrocity of pouring all kinds of wine, white and red, of all countries and all ages, sweet and sour and bitter, into vats, as is now done in the docks, adding spirit to them to keep them from perishing, as they do with preparations in our museums, and then exporting them to other countries. But do they always go to other countries? The evidence of the authorities of the Customs at the Docks tells a very different tale. Mr. Cole, Comptroller of the Customs in the London Docks, among numerous other examples of heterogeneous mixtures of wines vatted in these docks, gives us the following, dated October 16th, 1850 :—

“Spanish wine, 1,529 gallons; of Fayal wine, 544 gallons; of French wines, 4,492 gallons; of Cape wines, 689 gallons; of Portugal wine only 117 gallons, with 154 gallons of brandy, the result obtained being 7,525 gallons, minus 8 gallons loss; and the grand result is 7,533 gallons of port wine thus manufactured.”

All of this was exported: we do not know whether in this case in port-wine casks, but in other cases it was notoriously so; the wine, if by courtesy we may so call it, was sent to one of the Channel Islands, the ship merely touching at the port and returning in a few days with her cargo as port wine. In many cases fabrications of this kind come here from Cette, but by this ingenious process, by a boomerang sort of movement, the fictitious port comes back to our own land as the genuine production of Oporto! The same process is still going on, but in consequence of the reduction of the duty on the lighter French and other wines

consumed in such concoctions, the temptation to such frauds is greatly enhanced, an increased profit thereby accruing to these audacious speculators in mixed wines.

Leaving out of the question the fraud that is perpetrated by passing such stuff off for port wine, let us apply ourselves to the assertion of those who are guilty of these mixings, that they are quite as harmless as the blendings of the grocer when he mixes Mocha coffee with Jamaica coffee, or a certain portion of green with black tea, or of the publican when he draws you a pint of half-and-half; but there is this essential difference in the intrinsic nature of the two articles so mixed: in the case of tea or coffee, or beer and ale, there is no time for the fermentative principle to take place in such infusions to disturb their character ere they are consumed. Once give the wine merchant the power of making up his wines to suit his own pocket instead of the tastes of the public, and the ignorance of the public will give him full play to do what he likes. Confound the pure wine taste with various additions, and the problem is reduced to the absurdity exposed in the following advertisement, which appeared in the *Times* of 1865:—

“Partner wanted.—A practical distiller, having been experimenting for the last seventeen years, can now produce a fair port and sherry, by fermentation, without a drop of the grape juice, and wishes a party with from £2,000 to £3,000 to establish a house in Hamburg for the manufacture of wines. Has already a good connection in business. Apply to —.”

No doubt much of the “Hambro’ sherry” which

was introduced here a few years ago was of this character. We are glad to learn that this made-up wine is no longer largely sold as such, some parcels of this so-called wine having been stopped by the Customs by the charges laid upon them as mixed spirits. We have thus one vile adulteration the less openly circulating amongst us; but a considerable portion comes in, and is sold to a few houses, who mix it with the cheap sherries sold at the grocers, and of which it forms a very large proportion. Elbe sherry—the clever fellows who introduced it might just as well have said Arctic Circle pine-apples—has also disappeared from the scene. But why should we permit ourselves to be ruled by a name? It is well known that all the cheap ports are made up of other wines in wine merchants' cellars. Spanish red, Benicarlos, Roussillon, &c., are all good wines of their kind, but they can only get into circulation under the one name we are familiar with—that is, at least among the class who take anything for wine upon trust, and nothing by knowledge.

The fact is that the vitiated taste for artificial wines keeps the natural wines out of the English market. Dr. Gorman stated with truth to the Committee of 1852, "If your taste was directed to natural wines, Spain alone could supply this country with hundreds of thousands of butts of beautiful choice wines which are not known in the market" (5721). Within the latitudes 35° and 47° the whole of Europe is capable of producing fine wine. Portugal grows a hundred wines that we do not know even the names of. Some of

these, Mr. Olivarez tells us, are to be sold for 6d. a dozen bottles. Here are some of the wines, *Arinto*, *Tozal*, *Thomar*, *Colares*, *Lavradio*, *Terno*, *Carcayello*, &c., all pure well-fermented wines requiring no spirits to keep them. The wines of Hungary have established a footing amongst us. "Carlovitz" and "Erlauer" are familiar names in our mouths. Ofner is a capital wine, and Tokay is no longer the rarity it was a few years ago. The wines of Italy are unknown abroad, with the exception of the Sicilian Marsala and Zucco, manufactured by English houses and on the Duc d'Aumale's estate near Palermo; but the Italian vintages and the art of making wine there have been so much neglected, that the natural wealth of the country in this respect, as in many others, is unexplored.

Greek wines, the latest of the strangers we have welcomed from abroad, possess great natural strength—the highest of any pure wine—together with very delicate flavour. Dr. Druitt has done much by his excellent work on cheap wines to bring these capital vintages into notice, but it is to Miss Bremer that the public are indebted for the earliest account of them in modern times. In her pleasantly-written volume, "Greek and the Greeks," speaking of the wines of these islands, she says:—

"The wines of Santorin will keep good year after year. They are sent to Turkey and Russia; Odessa, in the Black Sea, is one of their chief markets. I have visited a great wine cellar excavated within the mountain, and have there tasted sixteen or eighteen different sorts of wine, all prepared from the wines of Santorin. I was most pleased

with the wine of Bacchus—very like that of Naxos—with the taste of nectar, and the colour of pure gold; so also the wine of night (St. Elie), which is colourless, and has obtained that name from the fact of the vintage taking place during the night, and from the grapes being hidden under the leaves of the vine, and not exposed to the influence of the sun, by which means the wine is not coloured by it."

This St. Elie, a white wine, possesses very fine qualities, finer than anything but the purest Amontillado sherry, at a price within the reach of all. The red Keffesia, again, is very like a fine Burgundy, but with more body. The red and white Hymettus are charming wines, much stouter, and yet more delicate than the light French wines at the same price. The stoutness of these wines is very likely to recommend them to Englishmen's palates, but it is the stoutness of real vinosity, the wine flavour being covered by no adventitious spirit. Thera, for instance, is very like Madeira. The wines are grown in the volcanic soil of the Island of Santorin, the best of all soils for good wine. It must be remembered that the really fine wines cannot be grown upon land that will grow corn. Sandy, slaty hill-sides, shales, the *débris* of the older rocks, the sites of extinct volcanoes, &c., afford the best soil for vineyards, whilst the fat loam which most abundantly produces wheat will not grow a delicate wine. It would seem as though Providence, in arranging for the great staple articles of sustenance by which man lives and rejoices, has so ordered things that they never shall encroach upon each other's domains.

It has been denied that wine will ever come into

consumption among us as it does upon the Continent. That it will never displace beer among the working classes we freely grant; but above that class there are a very large number of persons residing in our great towns who cannot habitually drink beer, and who would prefer good wholesome wine at a cheap rate. Moreover, many of those who now drink wine take it as a common luxury after dinner. There are very few who drink it as a beverage. Possibly the large number of Englishmen of all classes who visit Paris every year will find the bottle of *vin ordinaire* flanking their dinner-plate, as a matter of course, in every restaurant, and some will not dismiss it on their return home. That it is by degrees creeping into our dining-houses is certain, and within these last few years London has seen a sight it has not witnessed since the days of the Restoration—claret and Burgundy drawn direct from the barrel at the wine-shops, as much as eight pipes a week being the ordinary consumption of one house in the Strand. As long back as 1852, before the admittance of the light wines at the 1s. duty, Mr. Short's bar in that street was daily thronged by customers for all kinds of wines; but from that time the consumption has increased amazingly. In his evidence before the Wine Committee in that year, being asked if he thought wine would replace beer, he made the following remarkable statement:—

“ Even as it now is, if you were to see my bar, and see the people come and drink wine; they take a glass of wine—bricklayers' labourers, coal-heavers, journeymen carpenters, and men of all grades—come in and take their fourpenny glass of wine, and go out

and say, 'Mr. Short, what a beautiful glass of wine that is !' and they go out sober. You never see anybody drunk in my house ; we have one thousand people a day in it, and not a drunken man among them."

There is a still larger establishment for the sale of light wines at the Shades, London Bridge, and they are now indeed scattered throughout the metropolis. We have no doubt that the increased sale of wine will be the greatest blow to dram-drinking that has ever been given, and Mr. Gladstone may consider that the treaty with France has placed him in the first rank among the apostles of temperance. Since the evidence was given before the Committee of 1852 many of the most respectable grocers in London have turned vintners. Before the introduction of the new tariff the wine trade was in the hands of a few houses, and wine was considered a matter for laying down in large quantities ; the wine merchants of the old school were not even retailers. A man fagged with hard work would not have dared to go into one of these grand establishments, as he may now into the grocer's shop next door, and get a bottle of cheap light wine to take home for his dinner ; it is true he gets sad trash as long as he confines himself to our "old crusted port at 1s. 9d.," or real Xeres sherry at the same price, but claret and Burgundy he may obtain far cheaper, and we see that Gauphine, a strong red wine of the Hérault, is now sold at 9s. a dozen. These he may indulge in with safety, but we would recommend him to receive with caution so-called festival wines, champagne above all things, from such quarters. It should be remembered that any wine may be made sparkling by the aid

of a little liquid barley sugar, which sets up a fermentation in it, and fills it with carbonic acid gas. This being the case, common coarse wine, much more potent than any that comes from the champagne district, is so treated, and the consequence is that the drinker, believing that he may indulge in it liberally, finds that he speedily becomes less steady and collected than he would wish to be. We are told, indeed, that some of the better-class champagnes are adulterated with brandy to suit the English market; and a tale comes across the Atlantic to the effect that our American cousins are using refined petroleum for a similar purpose! In Hamburg, in one of the public gardens known as Schmidt's Tivoli, an enterprising public purveyor has erected a magnificent syphon fountain from which flows champagne at 2*d.* per glass! It is scarcely necessary to say that not a hundredth part of the wine that goes forth with showy labels and with well-known names ever comes from the champagne district at all. Knowing as we do that the vineyards of Epernay, Fleur de Sillery, &c., are limited in acreage, how can we account for the astounding number of wines so labelled in the shop windows? It would require a province to grow anything like the quantity offered for sale every day in the grocers' windows alone. An official investigation has established that France exports to England 4,000,000 bottles, to India 5,000,000, keeps at home 2,500,000, sends to Germany 2,500,000, to Russia and the North 2,000,000, and to Belgium 500,000 bottles, with some smaller quantities to other

countries. The Americans assert that they drink 7,000,000 bottles more than is mentioned in this allowance, and knowing as we do that champagne is the favourite Russian wine, it is ridiculous to suppose that they are satisfied with four times as much as Belgium.

"Surely there must be something very charming in this popping"—to use the words of a New York journal—"which is so small an affair when made at the mouth of a ginger-beer bottle, and is so astonishingly musical above the names of Bar le Duc and Epernay, that people should go on from year to year smacking their lips with satisfaction over every species of imitative mixture, generally repenting with equal regularity in the horrors of a sour stomach and a racking headache on the ensuing day."

We are afraid that in the old country we get the headache and the sour stomach from imitative mixtures altogether wanting the magic pop that beguiles Brother Jonathan: we fear father and son, in the matters of wine, are equally imposed upon.

But it is not with these fancy wines that we have to deal in considering the ordinary qualities that may be drunk with the dinner, after the manner of the French, and indeed most continental nations. Even the prices we have quoted are exorbitant—Chancellor's claret included—compared with what good wine can be purchased for abroad, and it must be remembered that we ought to get wine as cheaply here as in any place in the world. Our insular position enables us to have the wine conveyed very cheaply to all our ports. We are told, indeed, that many of the stout wines of the south-east of France can be brought cheaper from Marseilles by sea to English ports than

they can be conveyed to Paris. France alone produces 17,000,000 hogsheads of wine per annum. The natural wines of Spain could yield us 100,000 pipes, Portugal the same amount, full-bodied vintages which could be put upon the table at 1s. per bottle, after yielding to the wine merchant 40 per cent. profit. Hungary could spare us 600,000 gallons annually. Sicily, the land of wine, could yield us any amount of red wine. Much indeed of what goes to make port could come in much cheaper than the lowest-priced clarets France has yet sent us. With these vintages at our sea-doors wine should be sold as cheaply as bottled beer, and we have no doubt that in course of time it will be. Of course we do not refer to any of those wines that are treated as articles of luxury, and which will command high prices at all times. Old port will always be dear, for the reason that it must remain in bottle for years before the adventitious spirit it contains has amalgamated with the wine and sobered down, enabling it to develop its fine ether which gives bouquet.

M. Pasteur, at the instigation of the Emperor Napoleon, has investigated the value of heating wines in water baths, and he finds that it gives them all the qualities derived from age—in fact, it ripens them, gives them age, and destroys those germs of parasitic vegetation which lead to the destruction of the finer qualities of light wines, and prevent their travelling. The heating of wine is as old as the time of Pliny, and it has been long the custom to boil the wine in Italy and Greece, but no one has investigated the

question scientifically until the French *savant* undertook the inquiry. He says there is a peculiar parasitic growth which attacks all wines of low alcoholic strength. After much experimenting he found that by heating wine in bottle to 130° Fahr. these germs were destroyed in a couple of hours, and were not liable to be affected again. What is more to the purpose, bottles half filled and covered with the parasitic mould so heated were rendered sound and good. In short, he affirms that he has cured the tendency to grow sick and turn sour of the light wines of France, and that wine so treated may be left exposed to the air without taking any damage. The commissioners appointed to test his experiments gave a decision highly in favour of his process. If time should back the opinion of these gentlemen, one of the greatest obstacles to the consumption of the light wines of France in this country would be obviated—it will be as easy to leave a bottle half filled without fear of its becoming sour, as it now is with the far stouter wines. If M. Pasteur is right, Madeira need no longer go a voyage to the East Indies at an enormous expense—it will double the Cape in an hour or so, by the ingenious process of the Frenchman. Wine in cask can be treated in the same manner, and it may be drawn afterwards leisurely, the oxygen of the atmosphere having no further action upon it. If this is all true, Oporto wine—we do not mean port—can be treated in the same way, and all excuse removed for the heavy doses of alcohol it now receives. Moreover, it will

acquire the mellowness and ripeness of years at once. We should not be surprised to find, however, if art should be able to accomplish so much, that mellowed port would cease altogether to attract the attention of connoisseurs. There are some people who like a thing irrespective of its real value, for the reason that few others can afford to have it; they will even delight in defects if they are in any way allied to rarity and great age. There is a period, an antique period, at which old port acquires what is known in the trade as the "pig-dung stink," which is prized by old gentlemen who keep old cellars far above the most fragrant bouquet any pure wine ever possessed. We may here remark, by the way, that bouquet, whenever it is met with in young wine, is an adventitious addition. There are certain essences sold to perfume new wine, and give it the aroma of age. All the ethereal qualities which the wine-taster feels for so delicately with his nose are given off by age. Young wine, with the exception of Muscat, possesses no trace of the delicate perfume of the grape from which it is made; these fine odours are wholly dissipated by the process of fermentation, and only reappear after the wine has been many years in bottle. If it were otherwise, we fear they would be anything but pleasant. The process of pressing the grape with the naked feet—one of those remnants of barbarism which the wine-makers still defend and maintain—would certainly not impart to it any aroma that would be pleasant, especially to Cape wine, where the blacks do the work.

"I was at dinner one day," says Dr. Druitt, "sitting next to the late Archdeacon —, from the Cape. I asked him the reason of the earthy taste in the Cape wine. He said, 'My dear sir, if you ever were at the Cape, and were to see the black fellows in the vineyard in the vintage time, and how they make the wine, you would think earthy a very mild term indeed to apply to it.'"

As regards wine generally, we may not go quite so far as Mr. Prestwich, one of the jury, who, speaking of some Hambro' sherry in the Great Exhibition of 1862, said that it "showed a marked improvement in the applied chemistry." Yet the more we hear of the doings in vineyards, as well as cellars, the more we are led to believe that we cannot depend upon many wines for being pure. It is a well-known fact, that even in Portugal and Spain, only one year out of every four is favourable to a good vintage. In cold seasons the grapes will not ripen, consequently there is too much acid in the must, and too little sugar. Nevertheless, we never hear of no wine being made on that account.

"In a good season," says Mr. J. J. Griffin, in his work on "The Chemical Testing of Wine and Spirits," "the grape juice possesses about 20 per cent. of sugar, and from 350 to 500 grains of acid in the gallon. The scientific correction of the sour must of bad seasons consists in increasing the sugar and diminishing the acid till both agree with the proportions contained in the must of good seasons. The acidity is reduced by water to the proper amount in the gallon, and sugar enough is added to produce alcohol sufficient to cover the acid. The addition of water does not enfeeble the bouquet!"

According to this statement, it is quite clear that in certain seasons we do not get even the constituents of natural wine from the vineyard. This should certainly teach us not to depend upon our supply of wine from

any particular country. A bad season in one wine-producing nation may be a very good season in another; the weather is never the same all over Europe. If our wine tastes were a little more catholic, this knowledge would lead us to buy only in the good market, leaving the "adepts in applied chemistry" to their own devices. But there is even a cleverer trick than that of making good wine out of sour grapes; and that is the process of making wine without grape juice at all. We are not referring to the Hambro' advertisement, but to a process that is carried on in the vineyards of Chameray, in Burgundy, according to the discovery of M. Petiot, a wine grower. It is certainly ingenious. We give the method of manipulating in the words of Mr. Griffiths:—

"The grapes passed between wooden rollers (we are glad to escape the foot-treading process), and freed from the stalks, are pressed into an upright vat, which has a false bottom. The must is now allowed to flow out while very little pressure is made upon the mass. The must so collected is treated in the manner described above. To the grapes left in the vat cold water is added to the volume of the must previously drawn away. The grapes are covered and allowed to soak in the water for two days, being frequently stirred. The water dissolves various soluble materials in the mark or grape skins, including the substance which gives to the wines their special taste and odour, and which it appears adhere strongly to the grape mark. At the end of two days the liquor is withdrawn, and tested for sugar and acid. It usually contains but 2 or 3 per cent. of sugar, and must have 17 or 18 per cent. added; usually also it is deficient in acid, and must have as much tartaric acid dissolved in it as testing shows to be needful. It is then set to ferment."

But even a third wine is made in the same manner from the grape skins, the only difference being that much more sugar and acid have to be added. Like the

Irishman's knife, that had a new handle and a new blade, so little of the original grape juice can have been left that we do not see why the process should not be carried on indefinitely, the tannin of the grape being chemically added, and the bouquet which the "addition of water does not enfeeble," given by means we have before alluded to. We sincerely trust M. Petiot will send none of his Burgundy to England; or, at all events, that we may never have the ill-luck to drink it. Ordinary Burgundy—and there is plenty of it—is very capital wine, cheaply produced; and we feel quite sure there is no necessity to resort to such questionable processes as this clever proprietor indulges in, possibly in consequence of some infirmity in his vineyard. Very possibly he has taken a hint from the proceedings of his fellow-countrymen at Cette, where adulterations have become the daily habit of the town, and where the "applied chemistry" is treated upon a manufacturing scale. Poor Angus Reach, in his "Claret and Olives," gives us a picture of the wickedness going on in this Mediterranean port, that should make us beware of anything in the shape of wine that hails from it—that is, if we know it:—

"'Ici,' will a Cette industrial write with the greatest coolness over his *porte cochère*,—'*Ici on fabrique des vins.*' All the wines in the world, indeed, are made in Cette. You have only to give an order for Johannisberg or Tokay—nay, for all I know, Falernian of the Romans or the nectar of the gods—and the Cette manufacturers will promptly supply you. They are great chemists, these gentlemen, and have brought the noble art of adulteration to a perfection which would make our own mere logwood and sloe-juice practitioners pale and wan with envy. But the great trade of the place is not so much

adulterating as concocting wine. Cette is well situated for this notable manufacture. The wines of southern Spain are brought by coasters from Barcelona and Valencia; the inferior Bordeaux growths come pouring from the Garonne by the Canal du Midi; the hot and fiery Rhone wines are floated along the chain of *étangs* and canals from Beaucaire. With all these raw materials, and of course a chemical laboratory to boot, it would be hard if the clever folks of Cette could not turn out a very good imitation of any wine in demand. They will doctor you up bad Bordeaux with violet powders and rough cider, colour it with cochineal and turnsole, and outswear creation that it is precious Château Margaux, vintage of '25. Champagne, of course, they make by hogsheads. Do you wish sweet liqueur wines from Italy and the Levant? The Cette people will mingle old Rhone wines with boiled sweet wines from the neighbourhood of Lunel, and charge you any price per bottle. Do you wish to make new claret old? A Cette manufacturer will place it in his oven, and after twenty-four hours of regulated application of heat, return it to you nine years in bottle. Port, sherry, and Madeira, of course, are fabricated in abundance with any sort of bad cheap wine and brandy for a stock, and with half the concoctions in a druggist's shop for seasoning. Cette, in fact, is the very capital and emporium of the tricks and rascalities of the wine trade, and it supplies almost all the Brazils, and a great proportion of the northern European nations, with their after-dinner drinks. To the grateful Yankee it sends out thousands of tuns of Aÿ and Moët, besides no end of Johannisberg, Hermitage, and Château Margaux, the fine qualities and dainty aroma of which are highly prized by the Transatlantic amateurs. The Dutch flag fluttered plentifully in the harbour, so that I presume Mynheer is a customer to the Cette industrials; or, at all events, he helps in the distribution of their wares. The French West Indian colonies also patronise their ingenious countrymen of Cette, and Russian magnates get drunk on Chambertin and Romanée Conti made of low Rhone and low Burgundy brewages, eked out by the contents of the graduated phial. I fear, however, that we do come in—in the matter of 'fine golden sherries at 22s. 9½d. a dozen,' or 'peculiar old crusted port at 1s. 9d.'—for a share of the Cette manufactures; and it is very probable that after the wine is fabricated upon the shores of the Mediterranean, it is still further improved upon the banks of the Thames."

The wine that is still most largely consumed in England is sherry, which being fortified, and making far over 26 per cent. of spirit, does not come in under

the 1s. duty, the rate being 2s. 6d. It has been used in England much longer than is generally imagined, according to Mr. Ford, who says:—

“Sherris sack, the term used by Falstaff—no mean authority on this matter—is the precise ‘Seco de Xeres,’ the term by which the wine is known to this day in its own country. The epithet *seco*, or dry—the *sack* of old English authors, and the *sec* of French ones—being used in contradistinction to the sweet malvoisies and muscadels, which are also made of the same grape. The wine, it is said, was first introduced into England about the time of Henry VII., whose close alliance with Ferdinand and Isabella was cemented by the marriage of his son with their daughter. It became still more popular among us under Elizabeth, when those who sailed under Essex sacked Cadiz in 1596, and brought home the fashion of good sherris sack.”

Mr. Ford thinks the modern liking for sherry was brought about by Lord Holland, on his return from Spain, at the beginning of the century. Mr. Cyrus Redding, however, says the fashion of drinking this wine was set by the Prince of Wales. It could not have been very long ago, as Mr. Redding tells us in his evidence: “I can almost remember the time; I remember when Lisbon, and Madeira, and Vidonia were the only table white common wines.” Yet what an age ago it seems when we talk of Lisbon or Vidonia! It seems like speaking of the roasted swan or any of the dishes of the middle ages. The universal use of sherry would seem to militate against our position that highly-alcoholised wines are declining in public favour, but on a second view of the case we find some explanation of this apparent discrepancy. Sherry is taken undoubtedly very largely at dinner—we might almost say universally—but it is very often consider-

ably diluted with water ; hence the steadiness with which it maintains its position in the British market. Last year no less than 5,511,302 gallons were consumed, or 41·35 per cent. of the whole quantity of wine consumed in the country. Large as this amount is, and giving evidence as it undoubtedly does, that sherry wines are greatly in favour, there are yet some consolatory points about the returns in a temperance point of view. This percentage shows a decline upon the three previous years ; not only has the use of the wine reached its culminating point, but—like its fellow, port—the lion and the unicorn that have long fought for British favour, if not for the crown—it shows certain signs of going down hill, and eventually of being “beaten out of town ;” the decline being 2 per cent. since the year 1863. Its prevalent use is undoubtedly as a luncheon wine. “A glass of sherry, sir,” is the subject of the charming little picture now so popular in the shop windows,—“a glass of sherry and a sandwich for sixpence.” This wine is triumphant about one o’clock, but among the higher classes it is certainly on the wane. We scarcely dare say it, but we fancy the ladies have something to do with maintaining from a rapid fall the highly-alcoholised wines of Spain. They almost universally take either sherry or champagne at dinner, and if they take a glass after dinner, we observe it must be one of the old-fashioned wines of early habit. They take but a glass, and that they like strong and sweet. It is but rarely that a lady takes claret ; they prefer a confection to a simple wine flavour ; at all

events, they do not care about what the lords of the creation term a dry wine.

But having reference to the very large consumption of sherry among the people, it must not be supposed that it is all Spanish wine that is sold under that name. Very large quantities of Marsala, Cape, and other white wines are mixed with products of Xeres, and under the magic name of sherry are unsuspectingly consumed as the genuine article. We fancy that Diogenes would require his lantern to find "the natural standard of sherry." We find it pasted up on the tops of the omnibuses, but nowhere else. If we could only get at the real constituents of the Spanish white wine that has so long ruled in England, we should undoubtedly find that a very large portion of the cheaper sorts were made up of light wines of other countries brought to the requisite standard of strength by potato spirit. In strictness, a large proportion of such wine should go to swell the quantity of light wine which has made such an extraordinary advance in our consumption since the lowering of the duty. Mr. Ford, in his "Gatherings from Spain," plainly says :—

"The ruin of sherry has commenced from the number of second-rate houses which have sprung up, which look for quantity, not for quality. Many thousand butts of bad Nubla wines are thus palmed off on the enlightened British public, after being well brandied and doctored. Thus a conventional notion of sherry is formed, to the ruin of the real thing; for even respectable houses are forced to fabricate their wines so as to suit the depraved taste of their customers." "Sherry," he says in another place, "is a foreign wine which is drunk by foreigners; nor do the generality of the Spaniards like its

strong flavour, and still less its high price More of it is swallowed at Gibraltar, at the messes, than in either Madrid, Toledo, or Salamanca . . . The men employed in the sherry vaults, and who have, therefore, that drink at their command, seldom touch it, but invariably, when their work is done, go to the neighbouring shop to refresh themselves with a glass of innocent Manzanilla."

Richard Ford (all honour to his pleasant memory !) had the merit of introducing this pure light wine to Englishmen—no mean achievement; for of all difficult things, the most difficult, especially in England, is to introduce a new wine taste. Manzanilla is pre-eminently a light dry wine, and its introduction to British tables is another proof that we are not irredeemably wedded to made-up spirituous decoctions.

There is no doubt that the wine of Oporto is slowly but steadily dropping out of use, going to the same limbo to which Lisbon has long been banished. In 1859, 2,201,306 gallons were consumed at our tables, equal to 30·97 per cent. of the whole quantity consumed; but year by year this percentage has declined, until in 1866 it had fallen to 22·57 per cent. It is quite clear that the disappearance of the once favourite port is only a matter of time, and, if we may prophesy, a not very long time. The late Baron Forrester spent his life in showing that in order to obtain port we were destroying very fine vintages for the sake of manufacturing a very inferior-flavoured and adulterated drink. The result has been that all true wine flavour is destroyed, and a standard set up such as the juice of no grape can produce. To use the words of the agents of the British wine merchants of Oporto, as far back

as 1754, who say that according to our tastes "it (port wine) should feel like liquid fire in the stomach ; that it should burn like inflamed gunpowder ; that it should have the tint of ink ; that it should be like the sugar of Brazil in sweetness, and like the spices of India in aromatic flavour." The persistence of this vitiated taste, in a minor degree it is true, is the only explanation that can be afforded for the absence from our tables of a number of Portuguese wines that we might have expected to have received upon the reduction of the duty in 1860. Portugal possesses immense resources in good natural wines of a quality stouter than the clarets of France, but possessing their fine qualities, which are alone sufficient to supply the whole of England.

We have no doubt that in Portugal and in other countries, when the real taste of the British consumer has been formed and ascertained, abundant means will be found to supply the demand. But the taste in wine which has existed in this country for the last hundred and fifty years was an artificial creation of restrictive duties and prohibitive laws. That taste is now undergoing a rapid and complete change. Old habits have, no doubt, a great influence on all such matters, and it will require one or two generations to teach an Englishman to drink wine like the rest of the world. But gradually freedom and nature will have their way, and meantime we are now happily at liberty to select from all the vintages of the earth those which are best suited to our palates, our purses, and our climate.

THE LONDON GAMIN.

ALTHOUGH we boast ourselves to be a practical people, it is wonderful how long we suffer a crying evil to exist before our eyes without making an effort to remedy it. And when we do exert ourselves, what errors we commit in the process! When we contemplate the number of prisons that have arisen throughout the country, built on the scale of fortresses of the first order, and consider that the administration of these places of punishment has become an important element in state affairs, having a most ponderous literature of blue books of its own which nobody reads but the officials, we ask ourselves the question with amazement: With all this gigantic machinery to punish crime, what steps did we formerly take to prevent it? There are at the present time upwards of ten thousand children, either entirely houseless or on the verge of being so, wandering about the streets, sleeping under railway arches, in market baskets, in shutter-boxes, in the parks, or pigging on the bare boards with their poverty-stricken parents at home, who in the daytime prowl about

the streets begging and stealing. If such a seed-plot of crime exists among us after twenty years of labour with Homes, Refuges, and Reformatories, what must have been the condition of outcast children in the days when punishment alone was meted out to them !

It is the theory of the Poor Law that every destitute human creature is entitled to shelter and food on application at the workhouse ; but, like many other theories that are the prime boast of the Briton, it vanishes into thin air when put to the test. One would imagine that nothing could be more undeniable than the right to immediate shelter of a poor child on a bitter winter's night. Let us see, however, what is the reality. On Friday night, January 4th, 1866, when the thermometer fell to two degrees below zero, and a pointsman was frozen to death at his post on the line at Reading, a poor little girl not more than nine years old was discovered by a gentleman curled up and trying to sleep upon a door-step in Piccadilly. Struck with pity (doubtless he had children of his own warm in bed at the time), he roused the child, almost fatally benumbed, took her to the workhouse, and desired a night's lodging for her ; but on inquiry it was found that *she belonged to another parish*, and shelter was accordingly refused. He then took her to the police-station, but the officer in charge could give no help, although he kindly offered to allow the child to remain before the station fire. The gentleman, however, preferred taking her to his own home, where she was

accommodated for the night; and next day he endeavoured to obtain from the clergyman of the parish an order of admission to some charitable institution. In this he again failed, and, as a last resource, at ten o'clock at night he applied to the secretary of the St. George's and St. Giles's Refuge for Homeless Children, by whom the little outcast was finally admitted into the Refuge. This case affords a good example of the difficulties placed in the way of poor children in the hour of need, and the want of elasticity to meet the exigencies of the moment in our many public and private asylums for the relief of the poor.

But as a means of rescuing poor children abandoned by their parents from the crime they are sure sooner or later to fall into, the temporary refuge, invaluable as it is, can be of little permanent avail for the innocent. What is wanted is a house in which every habit of their past lives would be eradicated, and fresh ones instilled. The philanthropy of the present day has been fully alive to this want, and one of the first of the institutions to supply it was the refuge we have alluded to as receiving under its fostering wing the poor little outcast of Piccadilly. A visit to the Boys' Refuge in Great Queen Street, Holborn, gave us an insight into the method which is now pursued by this and many kindred institutions to transform the outcast juvenile population, fast merging into the criminal class, into honest men and women, trained to industrial pursuits and to the service of their country, instead of becom-

ing, as they otherwise would, its scourge, burden, and reproach.

The vice of our old-established charities is the expensive nature of the machinery by which they are worked. There is a tendency to erect imposing buildings, to make complicated domestic arrangements, and to provide for a regular staff, which, in nine cases out of ten, eats up the greater portion of the income. No such vice or tendency can, however, be laid to the charge of the Boys' Refuge in Great Queen Street. An old coach-factory forms the physical home. Nothing could be plainer, indeed ruder, than its fittings; it possesses one advantage, however, without which such an establishment of boys could scarcely be maintained without danger to health, viz., very spacious rooms, in which a large amount of air circulates without the impediment of partitions. Like the Field Lane Refuge, no preliminary inquiries are necessary to enable a boy to enter its sheltering walls, other than the fact that he is not a convicted criminal; but, unlike the night refuges, it offers a permanent home to those who are inclined to obey its rules. On the occasion of our first visit the boys were in the full swing of their industrial pursuits: tailoring, carpentering, woodcutting, and shoemaking were going on under the eyes of the different masters. It was evident that nothing was wasted on appearances. The children looked like the Arabs of the street, which they really were; many of them, indeed, had only been just received. Their clothes were old rotten rags it is true,—the livery of

poverty ; but their faces were clean. One of the first virtues these little ones learn is the virtue of cleanliness, and a very necessary virtue it is, inasmuch as, with scarcely an exception, every boy on admission is covered with vermin, and in many cases suffering from skin diseases as a consequence. Nothing strikes the visitor with more astonishment, on going among those poor creatures, than their diminutive appearance—boys of fourteen and fifteen not being bigger than youths of nine or ten who have been well housed and nourished. But privation and hardship, although they dwarf the frame, have a tendency to sharpen the wits ; and this is found to be the case with the majority of the lads. The cleverness of town boys, as compared with those of the country, is proverbial ; but it was a complete study to notice the prematurely old faces of these children, and a still more remarkable study to hear them relate their experience and show their knowledge of the world. Only a few months back these lads had been turning catherine-wheels, sweeping crossings, and living the street life of this great metropolis, quickening their wits and making supple their bodies with the hard training of necessity ; hence the sharpness of their perception and the nimbleness of their movements.

The very little boys, on first entering the Refuge, are taught the use of the needle. It looked inexpressibly droll to see some score of little fellows seated in a row darning stockings, or learning the use of needle and thread upon a piece of rag. To see those newly-caught

little Arabs gravely pursuing such a sedentary occupation gave a certain shock to one's ideas of the fitness of things; yet nothing is more necessary to the sailor or the emigrant, which many of these little fellows are destined to become, than a knowledge of how to repair their own clothes. The cutting of firewood is another preliminary occupation to which the more juvenile boys are placed. This is a remunerative industrial pursuit, inasmuch as many friends of the institution purchase their firewood here. The more difficult occupations performed by the elder boys are shoe-making, tailoring, and carpentering. In two or three years some of the lads have learned sufficient to earn their own livelihood out of doors, whilst all the boot-making and repairing of the inmates, as well as those in the Girls' Refuge, are performed by these little workmen.

Being anxious to learn how many of the hundred and twenty boys at present in the Refuge had slept upon the streets, the master, whilst they were assembled at dinner, asked the question—How many boys have slept for a week together outside of any house? Instantly fifty little hands were held up. How many for three months? Thirteen held up their hands. It seems almost incredible that poor little children, for so many days consecutively, should have braved the weather, many of them through the winter months. Two or three of the boys told me that among the "pads" was a famous place to sleep in. "Pads" are small baskets in which fish is brought to Billingsgate

Market. One poor little fellow told me he "cuddled up" one night in a barge, and when the men came to work at five o'clock in the morning, one of them put a rope round his middle and "chucked him out into the river," pulling him in again and repeating the process "as if he had been a bucket of water;"—and this was in the winter!—"but," said he, "another of the men said he had little ones of his own, and he did not like to see me served so, and he took me to a coffee-shop and had my clothes dried, and gave me some coffee." We have all heard of the little vagrant who told his chum of the prime discovery he had made of a sleeping-place—the iron garden-roller in Regent's Park; but we question if even this odd resting-place could match the sleeping accommodation one pale little urchin confessed he was obliged to put up with, namely, a "drain pipe" at Sadler's Wells, and "Oh, it did blow round me cold!" said the little fellow, shivering with the bare recollection of his night's lodging. All the boys had slept in carts and market baskets in Covent Garden, and under the railway arches, and one lad said he thought he would one time make himself comfortable in a water-butt, but the snow came down when he was asleep and covered him. Who shall say what are the villanies perpetrated under the Adelphi dark arches, the well-known resort of houseless wanderers? "I slept there one night," said a little boy, "and there were above a hundred there at the same time, huddled about in parties of twenties in the different corners. The policeman came and used his belt to us, and drove us out—men, women,

and children, and we went into the parks. Another policeman said he didn't like to see us hit about, and he took me to a coffee-shop and gave me some coffee ; but another boy stole my boots, and I was obliged to go bare-footed." But there was one rather stout lad who spoke of his lodgings on the cold ground without the slightest sense of its having been a more than common hardship. "I used," he said, "to sleep in the 'New-found-out.' " "Where is that?" I asked, with a look of astonishment. "Oh, that is the arches underneath the Charing Cross Hotel," speaking of it as some delectable abode. It would be difficult to imagine a more dramatic contrast than that presented by these poor children, huddled up in the cold arches of the foundation of that splendid hotel, and the scene of luxuriance and comfort presented by the bed-chambers of its inmates. How little one half of the world knows how the other half lives! This wild, out-of-door, bitter life led by the majority of the lads before they enter the Refuge gives them an unsettled, untamable nature that is not easily conquered. Some boys, indeed, cannot resist the impulse to run away, not once, but again and again. They are literally wild animals ; as much so as the colt that has been allowed to run loose on the moors. Indeed, it often takes years to knock the vagrant disposition, which would almost appear to have entered their blood, out of them. We remember once asking a gipsy boy, who complained that his tent-peg gave way in the night and let the snow drift into his bed, whether he would not like to sleep in a house. "Sleep

in a house! Ah, no, couldn't sleep in a house on no account—couldn't do it nohow!" He said this with an emphasis which left no doubt on our mind of the outrageous nature of the proposition in the wild boy's mind. The vagrant habit once acquired, it is an almost impassable barrier to the ordinary service of the world. The errand-boy who plays truant is forthwith dismissed from his place; the apprentice, if the street Arab by any chance gets the opportunity of being put into harness, is summarily taken before a magistrate, and imprisoned for being idle and intractable. What hope, then, without aid, have those little ones of ever leaving their wild yet wretched state of freedom, and of being placed in the way of earning their livelihood by means of any of the paths of labour? As regards the virtues that make it possible to live the life of a civilised social being, the street Arab is wholly without them,—he is in most respects a little savage. And we all know that if we take a savage, and train him carefully among Europeans, his original nature is liable to break out in his descendants to the third or fourth generation. We must be prepared, therefore, to find that it is a work of great care, trouble, and expense in many instances to instil the new habits and to exterminate those acquired during a youth of vagabondage. When a child once falls into destitution, it is next to a miracle if he regains his footing without the aid of such societies as the one under notice. Let us give one example of the difficulties by which all such cast-aways are beset, in the case of a little boy once in the

Refuge. He was left an orphan at twelve, in Bristol, and not being able to procure work, he made up his mind to walk to London, and accordingly he started off, reaching the great city in a fortnight. When he arrived there he had a sore foot through walking all the way in bad boots, and found himself unable to work. He says: "One morning I was in Hyde Park, when a gentleman came to me, and seeing what a sad state I was in, gave me a shilling, and told me if I would meet him there the next night, he would give me some boots and a waistcoat, and told me to try and get some work." This seems to have been the first act of kindness shown to the young stranger in this vast metropolis. The boy was thankful for it, and appreciated the sympathy thus shown by his benefactor; but it was evident the poor lad was still cast down, for he says, when told to get work, "It is easy to talk about it, but not easy to get it in London without a character." He was quite right; it is not easy to get work in London even with a character. Nevertheless he did not sit down idle without making an effort to get work. As he says, "I did get a job now and then to wheel costermongers' barrows about for men who lodged at the same place as me, for which I got my lodging and food." This prosperity, however, did not last long, for he again hurt his foot, and was of no service to his friends the costermongers; and now he was as badly off as ever. Having, however, found one benefactor in Hyde Park, he seems to have resorted there again, in the hope, no doubt, that his poverty-stricken and

friendless condition might attract some sympathising, benevolent spirit. And sure enough it did, and one for whom the boy will have cause to bless God all the days of his life, for it was this friend who ultimately brought him to the Refuge. The boy's own account is this: "One night I was sitting by the Marble Arch, Hyde Park, when a gentleman came up to me and asked me if I was in want of anything. I told him I had no money to pay my lodging, and he asked me if I had any friends in London, and I told him I had not; and he asked me if I was willing to work if I could get it to do. I told him I was. He then took me to a public-house, and gave me some beer; but I wanted food more than beer, and I asked him for some, and he gave me some bread and butter. After staying there a little while the gentleman took me to Farringdon Street Dispensary, but the people were gone to bed. He called them up, and I showed them my feet, and they told me they could not do anything for me then, but if I would come in the morning they would see to it. The gentleman then got me a lodging opposite to the dispensary, and gave me some money to get my breakfast. On the morrow he came and took me to the Mansion House, and got a letter of recommendation for Bartholomew Hospital, which I took, and after waiting half the day was told I would not be admitted for a fortnight. I then went back to the lodging, which the gentleman paid for until my feet got better, and then he brought me to Queen Street Refuge, where I have been ever since, and never repented coming in,

for it has been a very good thing for me, thanks to Mr. Wood and other kind friends."

This lad has since been sent to Australia, where it is believed he will do extremely well. In reading this narrative, may we not ask ourselves whether we should have acted the part of the Good Samaritan to this poor lad? How often some pitiable object comes across our path in our daily walks, asking our charity, and, like the Levite, we pass by on the other side! In the majority of cases we dismiss the appeal under the plea that they should go to work, and we salve our conscience with the suggestion that the petitioner is a professional mendicant, or, at least, that there is the workhouse to go to, and that it is fostering mendicancy to listen to such appeals. We never reflect that a little aid will often save a fellow-creature from destruction, and it is only when we see such a case in print as we have related that we ask ourselves, "How many times might I have done a like good deed if indolence or indifference had not stood in the way!" It has been said that we sometimes entertain angels unawares. Has the gentleman who saved this little boy read this simple story of his kind deed? If he has, what pleasure it must give him to know of the good he accomplished! This, be sure, is the good angel which all of us feel in our hearts when we have acted in the spirit of love towards any of our fellow-creatures. Such work the Refuge for Homeless Children has been engaged in since the year 1852, and we question if a nobler work could have engaged philanthropists. From the Report

of 1865 we find that during the thirteen years in which it had then been in existence, 1,675 destitute children had been received into the Home, and tenderly treated, during varying periods, with the loving care which the term "home" implies. It is one thing to give food and lodging in the name of the law,—that is done at the workhouse; it is another to give it in the name and spirit of the All-giver. And it is this contrast which makes such a Refuge differ from the Union in its results. In the one case the recipient often leaves curses behind him; in the other, good wishes and kind words, and, like a child when in trouble or need, he returns again and again to the Home that gave him shelter, and is never refused. Of these 1,675 destitute children thus received, 1,016 were boys, and 659 girls, for the more dependent sex are also cared for by this institution, as we shall presently show. This little ragged army rescued from the dens of thieves has been disposed of as follows:—

BOYS.

- 298 emigrated to New Zealand, Canada, United States,
Queensland, Nova Scotia, South Africa, &c.
- 44 entered her Majesty's navy.
- 3 entered the army.
- 34 entered the merchant navy.
- 239 were placed in situations.
- 13 were removed to other institutions.
- 114 were restored to friends and parents.
- 4 were apprenticed.
- 9 died.
- 1 went to college.

GIRLS.

272	have been sent to service.
198	have been restored to their friends.
16	have been removed to other institutions.
5	have emigrated to Australia.
26	„ Canada.
20	„ New Zealand.
2	„ Tasmania.
1	„ Natal.
1	has married.
8	have died.

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If this is not a great work—greater than the founding of any minster or noble building, although it may not speak to the eye for unborn generations—we do not know what a great work is; and yet it has been done noiselessly and unostentatiously, without making any sign or mark, excepting in the hearts and deeds of those saved from destruction. It is worthy of note that the Home gives a preliminary education which fits the boys and girls for the various occupations in which they are likely to engage in after life. There is nothing “class” about the training; not only trades such as we have mentioned are carefully taught, but a supply of labour is furnished for the colonies, and many of the boys have emigrated, as we have said, and are now doing well in Australia, New Zealand, and Canada. It is the desire of the Committee, of which the Earl of Shaftesbury is the chairman, further to train boys for colonists by the institution of a farm, at which those who are inclined for such a life may be occupied in the cultivation of the ground, similar to

that long established at the certified School for Homeless Boys at East Barnet. When sufficient subscriptions come in, this new school for training will be established. We are very glad to find, however, that the Committee, no doubt through the interest of their influential chairman, have already accomplished another portion of the task they proposed to themselves—the establishment of a ship for the training of sailors for the Royal Navy and merchant service. We are told there is no want so pressing as this. In consequence of the higher wages obtained in the United States, there is the greatest difficulty in obtaining sailors for our mercantile marine. It is said that there were no less than forty Dutchmen on board the ill-fated *London*, who, on the approach of the storm in which she was lost, refused to work and went to their berths. If this really was so, and if the commercial navy is obliged to put up with so large a percentage of foreign sailors as that instance would indicate, it undoubtedly points to one source of that increased marine disaster which of late has been so marked. The training-ship, which now lies at her permanent moorings at Greenhithe, is a fine 50-gun frigate of the old model, named the *Chichester*. Like scores of other ships in her Majesty's service, she has never been to sea since she was launched in 1842. Her loan by the Admiralty, therefore, caused no loss to the service; indeed, if all the old wooden ships could be turned to as good a purpose, they would not have been built in vain. Their lordships, however, would not find a spar towards rigging her; conse-

quently this has been done at an expense of £3,000, for which the Association is responsible, and for which subscriptions will gladly be received.

We paid a visit to the *Chichester* a short time since, in order to see the boys in their new home. Fifty little fellows volunteered to go on board the moment the vessel was obtained; and twenty-five more are to follow immediately. Nothing struck us more forcibly, on questioning the children in Great Queen Street, than the universal desire on the part of these Dick Whittingtons to go to sea. They patiently submit to be made shoemakers and carpenters, and failing that, their hope is to get on board the ship; and our belief is, that every boy would run away from his bench to-morrow to join the little fellows now on board. Here is the secret of our naval power. What nation can cope with us on the ocean as long as all the youngsters are inclined to make for the water like young ducks as soon as they can get away from home? Captain Alstead, R.N., who has undertaken the training of these young sea-dogs, gave me an example of the likely material they were made of. The hammocks are hung at least four feet five inches in height from the deck, as they would have been for ordinary seamen, and it was suggested that the little fellows would find a difficulty in getting into them at that height. The matter was solved, however, by their all leaping in when piped to bed with infinite delight, the saltatory difficulty evidently imparting an additional charm to the sleeping arrangement. Fancy a street Arab not being able to

climb anything! Captain Alstead looked upon his lively little lot with eyes of real pride, and gave it as his opinion that in 'a couple of years most of them would be afloat, many as ordinary seamen, and all earning their own living. What more promising material than these boys as sailors for the Royal Navy? But alas! the red tape of the Admiralty here again comes into play. Boys can only be admitted into that service on production of the register of their birth; as though two-thirds of the poor destitute children in the streets, the greater portion of whom are illegitimate, knew anything about registers, even if their mothers ever possessed them. One would fancy that the spirit of adventure which runs in the blood of these castaways would have made them especially eligible for her Majesty's sea service; and so we trust it will by-and-by, when common intelligence enters into the arrangements of the authorities at Whitehall. All the boys on board are dressed in the open blue woollen shirt of the man-of-war's man, and when we saw them were holy-stoning the under-deck with a will. It is the intention of the Committee to increase the number of boys on board from fifty to two hundred, the large size of the frigate and the splendid flush decks giving ample room for that number or more. The lads will learn the whole duty of a thorough seaman. It will be remembered that the training-ship belonging to the Naval College at Greenwich is on dry land, in the garden in front of the Hospital; and for the protection of the lads in training, a large netting is stretched

some twenty feet from the ship's deck to catch any of them that may happen to lose their footing when going aloft. This precaution against accidents is dispensed with on board the *Chichester*, as it is found that the absence of the netting when the lads get into actual service makes them timid.

Some years since, the Government were inclined to lend a helping hand to these Refuges, which are doing the work it should accomplish itself. In 1858 the Privy Council allowed the Association half the rent, half the salaries of the master and industrial teachers, one-third of the raw material used in the Industrial School, and a capitation grant of five shillings a year for every boy. This is now altogether withheld, and the Association has to depend entirely upon private liberality for doing the real work of the State, namely, clearing our streets of the raw material out of which thieves and prostitutes are inevitably produced. The State spends annually hundreds of thousands upon the gaols and penitentiaries throughout the country for the punishment of crime, and gives but little to private associations for its prevention. The Government, it is true, say that if they give they must exercise supervision, and if this can be done as mildly as we find it done in the various Industrial Schools, no harm would come of it. As matters at present stand, the Committee asks for funds to accomplish the following objects:—

1. To retain one hundred boys in the present Refuge.

2. To support a "training-ship," where at least two hundred more boys may be educated and trained to a seafaring life.
3. To establish a "country house," with about one hundred acres of land, where one hundred more boys may be trained to agricultural pursuits.

As the annual expense of each boy is estimated at about £15, the total cost for four hundred will be about £6,000, a sum which philanthropy may supply with the certainty that its contribution will be doing a work from which good fruit, without one single drawback, must inevitably be gathered.

But the Boys' Refuge in Great Queen Street represents only one part of the operations of the Association. The Girls' Refuges, one in Broad Street, St. Giles's, and the other at Acton, each maintaining forty children, are equally worthy of notice. The Home in Broad Street, St. Giles's, has the advantage of that for the boys in Great Queen Street, inasmuch as it is a new building, intended originally for a gin-palace, but bought in the carcass and fitted up roughly, but sufficiently, for the poor girls collected from the streets. A very excellent system of training is adopted in this Refuge to fit the children for domestic service. Of course all the operations of the house are done by themselves; but there is a special training which must exercise them more or less successfully, according to their ability, for the position of that "real treasure," a thoroughly good servant. The great want of domestics

at the present time is thorough training. Any strong healthy girl thinks herself capable of taking a place nowadays, forgetting that she has no right to learn her duties at the expense of her employer. At the Broad Street Home, on the contrary, they all go through a regular system of apprenticeship, if we may so term it, during which each girl is taught to do one single duty for the entire number of inmates for a week. Thus one week she has to attend to the gas arrangements, a matter our abigails are generally profoundly ignorant of; the next the duties of a parlour-maid are performed; then the cookery week comes round, the bath-room arrangements, the scullery, the wardrobes, the knives and forks, and every detail of importance in a household is thus practically attended to on a large scale by every girl in her turn. Even that terrible nuisance, the breaking habit, which accompanies some servants through life merely from carelessness, is provided against in this Refuge. All girls who are found to have an inveterate habit of this kind are made to pay for all damages out of the pocket-money that is given them. This has a wonderful effect in correcting the evil, and the habit of carefulness, once acquired, is not easily lost. The girls, like the boys, are taught reading, writing, and ciphering, and their principal occupation is plain sewing. They make the boys' shirts, and the boys in return make the girls' boots and shoes. When a girl has been trained she leaves for service; and if she should lose her place she returns to the Home for a time. It is this almost

parental watchfulness and care for the girls which make such homes as these Refuges so powerful for good. They never let a child pass out of mind wilfully, and it is this knowledge that they are welcome back again, even if they have been in trouble, that keeps so many of them straight in after life.

When we visited the Broad Street Home, we found the girls, under the influence of cleanliness and good food, looking healthy and plump ; a perfect transformation from the dirty, squalid little things, tattered and torn, with broom in hand, as they came in just secured from some street-crossing. And the matron told us that the moral improvement after a little time is equally great, merely from the example set by the inmates who have been some time under discipline. Thus many girls that set all the rules at defiance on first admission, who laugh at the other girls for showing shamefacedness for faults, and at the idea of paying any attention to bad marks, in a very short space of time are fully as open to shame as the others. When they have experienced kindness, then their hearts warm, and all the better qualities of their nature gradually thaw out, like the frozen notes in Munchausen's horn. Love, in fact, is the key which opens their affections. We have seen, with astonishment, the little mouths of both boys and girls work for a moment, and then tears pour from their eyes, at the bare mention of their poverty-stricken parents, and the hovels they once knew as homes. So much tenderness is there still left in those little ones who have been so

badly entreated by the world. The little girl of the Piccadilly door-step, doubtless saved from inevitable death, now cleaned and warmly clothed, was among the other children ; and there were several who, like her, had endured the bitter weather all night under arches and in market baskets. The only difference between them and the boys in this respect was, that whereas the boys seemed eager to relate the hardships which they had endured, the girls seemed ashamed to confess them.

In the sick-room, at our visit, there lay a poor young negress suffering from hip-joint disease. Mr. Williams, the founder of this great institution (for it is great, measured by the good it does), and not only the founder, but the ever-watchful secretary, and the friend of the outcast likewise, whispered to me, as she lay with her picturesque, patient face on the pillow beaming with the indescribable sweetness of the Libyan Sphinx : "That girl was brought to me from Shadwell by a gentleman, who told me that her family for three generations had been prostitutes, just to try if we could make an honest girl in the fourth generation at least." And we said, "From the look of the girl we think you will succeed."

At Acton there is a similar Refuge, where the training is a little more advanced, to which the elder girls in Broad Street are removed previous to their being sent to service. In this establishment the washing of all the inmates of the Refuge is done, in itself no slight work.

There is another class of Home, however, which comes under the term Industrial School, and is somewhat similar in its scope to the Great Queen Street Refuge, but differs inasmuch as it is under Government inspection, and for certain cases receives money from the State. Unhappily, there are but two of these invaluable institutions; but the first established, the Boys' Home, Regent's Park Road, N.W., only requires more money to make it, in the best sense of the word, a real home to all destitute boys found about the streets of London. By the terms of the Industrial Schools Act, passed in 1866, any child apparently under the age of fourteen years, found wandering, and not having any place of abode, or any visible means of subsistence, or frequenting the company of reputed thieves, may be committed to any Industrial School for any period not exceeding five years; and any parent or guardian may bring before a magistrate any child under fourteen years of age whom the parents or the guardians are unable to control. And again, any child under twelve years of age, charged before a magistrate, punishable by imprisonment or less punishment, but who has not been convicted in England of felony, may be sent by him to an Industrial School, and the State may be charged a sum of five shillings a week for his maintenance. This is letting in the thin end of the wedge; but there seems to be no objection to it. Destitute children in all fairness should become a charge upon the State rather than upon the purses of the charitable and generous few; for the good these

Homes do is to the community at large, and the community should pay for it.

The Boys' Home, Regent's Park Road, was the first certified Industrial School under this Act. Indeed, there is only one other at the present time in the metropolis. This Home differs from the Refuge, inasmuch as many of the inmates sent here by the magistrates are legally detained for various terms, in some cases extending to five years. It may be called a forced apprenticeship, with this difference, that the boys are soon taught to feel that the authority of the law is tempered with kindness and consideration. Poor children who have never known what a home is in the best sense of the term, and to whom the family feeling is unfamiliar, must experience a strange sensation at being transported from the hard surface of the street, from the callous crowd of passers-by, who are deaf to their cry for bread, and at finding themselves suddenly received with sympathy and kindness; no longer kicked and cuffed, but treated like children of the household—like one of those children they must have seen in their rambles, *inside* the comfortable houses which to them appeared like paradise. Conversing with the matron of this institution, a kind, motherly person, with true womanly instincts, we were not surprised to hear that on their first admission many of these little ones were even suspicious of the little attentions shown them; it all seemed too good to be true; a kind of stunned feeling took possession of them until they gradually gave way to

what they found was the natural atmosphere of the place.

When we see the extraordinary fancies men will pursue; the time respectable gentlemen will devote to grow the largest cucumbers; the expense they will go to in order to cultivate pines finer than their neighbours; the labour even middle-aged men will encounter to climb a mountain peak a thousand feet higher than has been done before; the energy others will show in the pursuit of butterflies; when we notice these instances of devoted labour, we ask ourselves, "Is there not something they might do more exciting than fussing about in a hothouse, or even freezing on Alpine peaks? What a glow of pleasure it gives a boy to read of the noble deeds of the wandering Caliph, and of how he raised up those who were in poverty! His pathway in this dark world looks like a line of light which could only exist in Arabian story; but, in truth, the meanest of us, with a kind heart and a willing mind, may act the part of the Caliph. The law gives us the power of taking any child out of the gutter, out of the society of thieves, out of poverty and dirt, and, by the aid of a magistrate, putting him in the path of an honourable life. Will none of our cucumber-growers and butterfly-collectors turn their attention to nobler game, the rescue of human beings? We see by the papers that some members of the class which are generally supposed to live selfish and luxurious lives have already set this better example. The Marquis Townshend has taken more than one poor starving little fellow to the magis-

trates ; and we all know what the Earl of Shaftesbury has done for years in the same good cause. But there is much to be done, and many are required to help. Here, for instance, is a little episode, occurring in November, 1866, at Worship Street Police Court, in which any of us, instead of the police, might have played the part of the good Caliph.

William Hawkins and William Frost, with naked feet and nearly naked bodies, were charged before Mr. Cooke with being found destitute in the public streets.

Dolman, 119 H, deposed that he found the boys sleeping in an uncovered van.

Magistrate. What time was it ?

Constable. Two o'clock this morning.

Magistrate (to the eldest boy). How old are you ?

Frost. Going on for my eight.

Magistrate. Where are your parents ?

Frost. I ain't got none : father's dead, and mother's gone away somewhere.

Magistrate. How long have you been sleeping about the streets in this way ?

Frost. Oh, about half a year—no, three months. I ain't got no 'lations (relations).

Magistrate. What do you do for a living ?

Frost. I don't know. I hold horses sometimes.

Magistrate. Where did you last see your mother ?

Frost. At Dalston. She lived somewhere there.

Magistrate. How old are you, Hawkins ?

Hawkins. I'm all six.

Magistrate. And where did you sleep last ?

Hawkins. In a wan.

Magistrate. No, I mean before you slept in the van.

Hawkins. Eh? I don't know.

Magistrate. And who is your father?

Hawkins. I ain't got a father, and mother's gone away; she said she couldn't keep me no longer.

Magistrate. When was that?

Hawkins. Eh? About a month.

Here were two children, ripe for the devil's sickle, luckily rescued and passed, under the new Act, into the Boys' Home. In an afternoon's walk we meet scores of such cases, but in too many instances we turn aside from these pitiable objects with a sense simply of annoyance at their importunities. It is from want of real knowledge that we do so. Hunger and cold are not things that can be dramatically shown. It is necessary to follow those poor little children to their homes to realise what they suffer; and it is further necessary to make an effort to relieve them, instead of solemnly comforting ourselves with the assurance that "the poor ye always have with you."

The honorary secretary to the Park Road Institution says, in a note to the writer, "I wish I had the power of a ready writer, that I might describe to you the horrid house in Seven-Star Alley, St. Giles's, out of which, ensconced under a filthy old four-post bed, I dragged one of our *runaways*, W. S., formerly the crossing-sweeper at the corner of Hey Hill, Berkeley Square, and now a fine trustworthy young man, under-gardener at Sir F. A.'s." I quote thus much of a very interesting

communication for two reasons : that possibly some of the readers of this paper may remember the little boy from the description of his sweeping location ; and for the more important reason of showing the pains taken to recover backsliders, the love and forgiveness shown to what would appear like ingratitude on the part of the boys who, after having been taken care of in the Home, have run away. In looking over the registers of cases received into the Home, nothing has struck me more forcibly than the fact that in many cases the boys have run away again and again, have even gone away with money, but they have not necessarily been discarded from the institution. Either the secretary has, with much trouble, himself brought back the runaways, or the other boys or the police have done it, and they have been received like the prodigal son. And what has been the fruit of this tender forbearance ? In nearly every case such boys have eventually turned out well. Some of the most promising boys now either serving her Majesty in the army and navy, or doing the work of sturdy colonists, are the very lads who so often absconded. There is splendid material in these wild and irregular young fellows, when once thoroughly conquered by kind and careful training ; and it is this quality which Mr. Bell, the honorary secretary, prides himself upon, and justly so, in the management of the Boys' Home. When the overpowering necessity of State aid, in some form or other, to meet the gigantic nature of the juvenile destitution still existing notwithstanding the efforts made by philanthropists, comes to

mind, our only fear is that with State machinery we should get, instead of such secretaries as Mr. Bell of the Home, and Mr. Williams of the Great Queen Street Refuge—gentlemen who work with their whole heart and soul for these little ones, as they would, indeed, for their own children in the like distress—some formal official, working with the regularity, immovability, and want of feeling of a mere machine. God forbid such a change! for it is the thorough human sympathy that constitutes most of the good of these institutions, and all their softening and improving influence.

At the present time there are about sixty-five boys in the Home in the Regent's Park Road. These little fellows, varying in age from eight to sixteen, are not only taught reading, writing, and arithmetic, but the trades of brush-making, tailoring, cabinet-making, and shoemaking; to mend their clothes, and to earn their food. We question indeed if, as colonists, they are not far better educated than the middle classes. Whilst in the institution many of them go out to work daily as shoe-blacks and knife-cleaners, in some cases as errand-boys, returning to sleep at the Home, in which case the money earned goes towards their maintenance. As we have said before, when the children are without parents or friends, the Privy Council pays five shillings per week for their maintenance and education; but when the parents are living, the magistrate makes an order upon them for a weekly payment, according to their means. There are many children, again, sent by benevolent individuals on the payment of the Govern-

ment rate of allowance of £13 per annum. When we see the sums of money some persons will give in the form of memorial windows to churches for mercies or benefits received in this life, we cannot help thinking that it would be far more profitable to make a memorial of some poor child rescued from vice and sin. We are sure that in the eyes of the Almighty it would be far more acceptable. For a trivial yearly sum any one may experience the luxury of lifting one poor child from the kennel, and it may be of giving himself an interest in some human being which he never experienced before. If such a personal interest be not considered desirable, there is still pressing want of money to sustain the Home in its present position, and a desire, indeed a crying necessity, for its extension tenfold, which must in some measure be met by the charitable. The capitation grant of five shillings per week is not sufficient to pay the expenses of the boys continually sent here by the police magistrates. It seems extraordinary that the Legislature should pass a most comprehensive Act for the rescue of the juvenile population from crime, but should have forgotten to provide the means for their adequate reception and maintenance. If it would only give a tenth part of the sum for the prevention of crime that it gives for its punishment, half the prisons in England would in a few years be vacant, and the ceremony of presenting the judges with white gloves would be a very common occurrence at our assizes.

CARTES DE VISITE.

Now that every bookseller's window is converted into a portrait gallery, and the public demands some knowledge of the *personnel*, as well as of the deeds and speeches of men of eminence and notoriety, the *carte de visite* has become such a great institution that it is worthy of some special notice. These handy little records of old familiar faces stand in the same relation to the grand portraits that grace the National Gallery and the drawing-room that small change does to gold or paper money. They are the democracy of portraiture. As the sun shines alike upon peer and peasant, so when he wields the brush he is equally impartial, and you may now purchase in Seven Dials as good a picture, as regards mere likeness, as can be procured in the more aristocratic quarters of the town. When we reflect upon the horrible effigies the last generation of the middle and the upper portion of the working classes were satisfied with—upon the miserable silhouettes snipped in black paper on board the penny steamers—upon the “likenesses in this style four shillings,” the value of the photographic portrait comes forcibly before us. But the very fidelity with which this new art

copies what is set before it renders it all the more necessary that the operation should be both skilful and artistic. It does not always follow that persons in the highest station command the best portraits. It is notoriously otherwise, in fact, with regard to the highest lady in the land. There has scarcely been a good portrait recently taken of her Majesty. This seems perfectly unaccountable; but we understand that the same etiquette which would not allow the chafing-dish to be removed which burned the Spanish king, except by the proper official, will not permit of the artist posing his august sitter. The best attitude, the most agreeable light, the most pleasing expression which he may select, or call forth from the ordinary sitter, is denied to him by the court rules of the lady whose *carte de visite* is the most universally in demand. When Prince Albert was alive all etiquette was banished; he himself with his artistic instincts posed his Royal Consort, and the photographer found the most delicate part of his work done for him. At present the Queen merely takes her seat, and intimates through her secretary that she wishes to be taken in a certain attitude, and the artist has nothing to do but to comply with the order. It must be evident that photographs taken under such circumstances cannot be very satisfactory. Even such as may turn out well never reach the public, inasmuch as her Majesty purchases for her own use all the best negatives, prints from them being taken by her own photographer. There is one photograph of the Queen, crowned and

dressed in the royal robes, the history of which seemed a mystery, but the explanation of it is this: a well-known photographer took a likeness of the Queen of Spain similarly attired, which Isabella forwarded to her Majesty, desiring a similar return carte. This is the only regal instance, we believe, of an exchange which has become so common in society.

The public does not appreciate the fact that very careful dressing is required to obtain a satisfactory audience of the sun. Sol is even more inexorable than any court flunkey in such matters. The public seems to think that the sun takes cognizance of any colour that may be presented to him, and finds out its mistake when too late. Yellow or orange may suit the brunette, and mauve, or the lighter shades of blue or grey, may harmonise with the blonde; but in the camera it is far otherwise. The yellow ray of the spectrum does not affect the silver plate, whilst mauves, purples, and blues do most actively; thus when the printing process reverses the shades on the photographic plate, the yellow becomes black, and the delicate light colours above mentioned print nearly pure white. Thus sitters sometimes become so altered in their photographic portrait that they scarcely recognise themselves. Gloriana with golden hair comes forth with raven tresses, and the yellow rose in Rebecca's coiffure is as black as the locks they adorn. A certain class of people, again, like the sun to register their finery. Ladies who but seldom go to court wish to make the most of the occasion, quite regardless of the fact that

stiff brocades, especially during the crinoline fashion, give anything but an elegant contour to the figure. There has been of late, however, a very great improvement in this respect, and all the better-class photographers have learnt to impress upon their sitters the value of simplicity, both as regards pose and dress.

In certain quarters of the town, however, the rage for pretence is as great as ever, both on the part of the sitter and the photographer. It will be observed that the lower the neighbourhood the more varied the amount of properties or scenic decorations to be found in the studio. Possibly the carpenter would prefer being taken working at his bench, but the photographer, who artfully prefers pleasing his wife, places him upon a terrace with a far-stretching landscape as a background. Servant-maids, again, are seated in splendid boudoirs, and respectable tradesmen are placed in extensive libraries, whereas the only books they feel at home with are their day-books and ledgers. All this is the mere snobbery of the art, which we rarely see practised in better-class studios. A flat grey background, which throws up the figure without cutting up its lines, is now almost universally employed. Nevertheless the ignorance that is occasionally displayed by people of the better class with respect to the manner of taking the photograph would scarcely be believed. On one occasion two ladies entered the sitting-room of a studio, and placing themselves before a mirror, after some time wished to know if the portraits were not finished, evidently thinking

the looking-glass was the operating agent. In another case we heard that a young lady intimated her desire that her hair should be made a little longer; and it has been requested that even jewellery should be omitted in a portrait, the sitter making no attempt to remove it herself. One old gentleman in the country even sent up the colour of his hair to the colouring artist of the Stereoscopic Company, and called four days afterwards to inquire if the portrait was done! Young-lady sitters during the present fashion of dressing the hair are not photographed to advantage, the chignon affording a very unsubstantial foundation for the head-rest.

The rage for the *carte de visite*, which has lasted so long, seems at the present moment to be on the decline, or rather we should say other sizes are now becoming saleable, which formerly was not the case. The reason of the popularity of the *carte de visite* is obvious. The small size of the picture employs only the centre of the lens—its truest part—hence the clearness and the sharp definition it gives to the features; but what is gained in these particulars is lost in modelling and half-tones, which give all the delicacy of expression to the face which we see in cabinet photography and the vignette heads. These latter are generally cut out of large existing photographs, and are not taken for the occasion. The beauty of some of them, especially of the leading actresses, is pretty sure, we think, to bring the new size into fashion.

The sale of *cartes de visite* is scarcely a fourth of

what it was when they first came into vogue. All our photographic albums are filled; the whole of our friends are represented; and the celebrities of the day and children now mainly keep the photographers in employment. But the sale of noted individuals and of the Royal Family is still immense. Some of the wholesale houses do an enormous business in this article.

The Messrs. Marion, in Soho Square, alone possess the cartes of many hundred thousand persons. This house does not photograph, but merely purchases of those who do. The possession of negatives of famous persons is a fortune to a man. Mr. Mayall, of Regent Street, who has photographed nearly all the Royal Family, has been paid, by the house of Marion alone, upwards of £35,000 for cartes de visite of its various members. The Stereoscopic Company, which photographs as well as purchases negatives of any celebrity that may be inquired after, possesses a portrait gallery which includes every known person of any distinction. It is scarcely necessary to say that any matter which brings an individual into public notice at once raises the value of his carte de visite. Tom Sayers's battle with Heenan sold fifty thousand of his cartes de visite. The gallant bearing of the Queen of Naples placed her photograph in every album in the kingdom. Many a man, through some accidental circumstance, wakes up and finds himself famous, and in two or three days his carte de visite is staring at him from every window in town. If any illustrious person is reported ill, there

is an immediate inquiry after negatives, and as the pigeon-holes of Printing-house Square are always kept well supplied with biographical sketches of statesmen about to depart this life, so the photographic printer anticipates their death by keeping a large supply of cartes de visite in hand. We scarcely know whether a statesman would be pleased or shocked at such an anticipation of his decease. It may not be pleasant for any man to know that others are eagerly making a market of such an event; but then, on the other hand, it must be highly flattering to know that when he has gone hence and taken with him the original, he has left so many copies behind. Whether it was that Lord Palmerston had, during his lifetime, discounted his popularity, or because of any reaction which has occurred with respect to his memory, we know not; but it certainly is an undoubted fact that his carte de visite is no longer called for, whilst those of many of his contemporaries, now deceased, are still in very fair demand. Thus Cobden is still largely sold in the market, possibly because he represented a principle which is dear to the hearts of his countrymen. Next after royalty, the photographs of statesmen, we are told, sell the best; but even the most eminent of these are local in their sale. The politics of our leading men may be even guessed by the district in which their cartes de visite sell. Thus, Bright sells largely throughout the North, whilst in the West he is rarely inquired after. Next to statesmen, the largest demand is for actresses, especially operatic singers.

When Jenny Lind was on the boards her *carte de visite* sold very largely, but nothing like that of Adelina Patti, which has quite astonished the photographers themselves. The Messrs. Marion alone have sold, within these last five years, seventy thousand copies of the portrait of this popular singer. In France, also, there is a very large demand for actresses and singers, but for no other persons of eminence. Our neighbours seem to care nothing for their statesmen, great men of letters, artists, or great religious teachers. Their homage, as indicated in this particular instance, is often of a sensual nature, and many of the pictures which disgrace the windows of the sellers of photographs are published either in Paris or in Brussels. The sale of clergymen of the Church of England is also very large, especially of those whose names have been brought prominently before the public, such as Keble, Pusey, Neale, Mackonochie, and of course the leading bishops. We have spoken of a photograph of Dr. Pusey, but this is not strictly accurate: he never would have his *carte de visite* taken, although pressed to do so, and on one occasion was offered a bribe of a hundred pounds for a charity with which he was connected. The *carte* we see of him in the windows is from a sketch taken surreptitiously whilst preaching. There is a *carte de visite* of the Bishop of Oxford holding up his fingers after the ancient method of giving the blessing, which caused some scandal at the time, and which is now withdrawn from sale; but a colonial bishop, Dunedin, now boldly

stands forth in the same attitude. His see being so far distant, little notice has been taken of this portrait. As a rule, portraits of Dissenting clergymen are not at all in demand. Of course we except Mr. Spurgeon from the rule. It is difficult to account for this fact, unless we are to suppose that the Dissenting element in the population, as a class, care less for art than Church people and those who move in society. It cannot be that they are less attached to their pastors, or that they prize them less highly than Church people in a spiritual sense.

What has become of what were once termed pistol-gram portraits? An instantaneous method of securing a likeness is no doubt a great desideratum, but we question whether, with our present means of posing the sitter, anything like a natural expression would be thereby secured. The act of posing a sitter is by no means calculated to secure a natural expression. Indeed, most people enter a photographer's studio with the same flutter they do the operating-room of the dentist, certainly with scarcely less nervous trepidation. In both cases the "patient"—we use the word advisedly—has to screw his courage up to the sticking-point. The sight of the tooth-drawing instrument may give a slight shock to the nerves, but we question if the effect is as visible on the countenance as that produced by the photographic manipulator gently pushing back the head until it is brought up by the head-rest—that terrible instrument which sets all the lines of the face into spasmodic contractions, effaces,

like the touch of death, all expression, and reduces the flexible human countenance to the condition of a mask. If the sitter recovers this touch of cold iron, the photographer's warning voice to "remain quite still" while he removes the cap of the lens and exposes you to the searching eye of the camera, generally settles the business and renders the first negative a failure. With such instruments of torture, used as they are generally without discretion, the pistolgram would only have the effect of giving the expression at the very worst, just as the first shock has paralysed or contorted the countenance. Photography, where living muscle is concerned, cannot be performed successfully at express speed. The best and most artistic operators are well aware of this; they allow the sitter to become accustomed to the sight of the instrument, just as a good groom, in breaking in a horse, makes him look quietly at every object likely to cause him to "shy." Again, all good photographers are aware that what is termed a good taking day, such as is favourable for printing from the negative, is by no means favourable for producing the highest specimens of his art. The full blaze of the sun, however shaded from the camera room, never yields those tender half-tones which give all the charm to a really fine likeness. Although the sitter may be in a room whose northerly aspect may wholly exclude the direct rays of the sun, yet his penetrating influence affects the whole firmament, and the effect is that the silver of the plate is affected so quickly in the higher lights that no time is permitted

for the drawing of the delicate half-tones, without which a photographic portrait is worthless. Hence a slightly cloudy day yields by far the best picture. Of course we do not mean a foggy day, especially a yellow, foggy atmosphere, such as we get in November; on such occasions the photographer cannot work, the whole face of nature being reduced to the tone of the room where he manipulates his negatives, in which yellow fog is simulated by yellow blinds. In the majority of cases the very clear definition of the picture gives a hardness which is not agreeable, and which the human eye never shows us. The iris is continually in motion, becoming larger or smaller to accommodate itself to the amount of light or to the distance at which objects are viewed. A certain softness is the result, which ordinary photographs do not give. We may illustrate what we say with reference to the hard outlines of some photographs by the effect they have when viewed in the stereoscope compared with the natural objects they represent. Stereoscopic pictures always look like hard clay models; they lack all the softening effects of the atmosphere. Stereoscopic views are particularly unpleasant, to our mind, for this very reason—atmospheric perspective is wanting in them; and although the different objects seem to be round, yet those parts situated on different planes seem as though they were but flat surfaces placed one before the other, just as the fly side-scenes at a theatre seem distinct from the back scene. The late Mr. Claudet, who was really a scientific manipulator, perceived this

error in ordinary photography, and patented a method of giving softness to his portraits which rendered them like fine mezzotints. This he did by means of a movable lens in his camera. A very slight movement broke up the almost metallic sharpness of this outline (which, we repeat, we never see in nature), and gave most agreeable portraits. The colour, again, of the photograph has a great deal to do with its pleasant appearance. A cold, grey portrait, which some photographers seem to admire, is not nearly so agreeable as those of deep chocolate colour, so full of warmth in their shadows. Mr. Ernest Edwards, who has given us such a fine portrait gallery of our medical men, has appreciated this fact; so did Silvi, who a few years ago most certainly stood at the head of all our photographic artists as a taker of *cartes de visite*, but has now retired from the profession.

Whilst we are referring to the question of colour, let us enter our protest against the barbarous practice of painting photographic portraits with oil colour. The absurdity of this practice is evident enough to the artists, who are only the servants of the public in this respect. When water colour is used, the photograph is printed specially light; the transparency of the colour, however, allows all the incomparable drawing to show through, and the result is most charming. Possibly the miniatures of Messrs. Locke and Whitfield are unmatched by the finest miniature painters of the metropolis in many particulars; but how different the result when the heavy oil colour obliterates, with

its material daubs, all the phantom-like grace of the sun's pencil ! It is urged as an excuse by artists who thus misuse their powers that the photograph is apt to fade in tropical countries very speedily, and even in temperate climates after a time—the effect being to remove as it were all the drawing upon which the colourist has based his picture. It is possible that the silver process is liable to this objection where a tropical sun has to be withstood, but the discovery of the process of printing portraits in carbon altogether removes this objection. The carbon photograph is absolutely indestructible, and there can be no longer an excuse for the use of any other material than water colour in the tinting of sun pictures.

It is a very common thing to hear a person say, “They never succeed with my photograph.” We admit that the portraits of our friends are capital, but our own are “not a bit like.” And there is something more than mere egotism in this remark. How few are the positions of one's face with which one is familiar ! We never see our side face ; it is very difficult to catch a glimpse in the mirror even of a three-quarter pose of the countenance ; hence many photographic portraits of ourselves are wholly unknown to us. Although the mere raw outline of a face may be given as well by an indifferent lens as by one of the best, yet a likeness in the highest sense of the word can only be obtained by the most artistic photographers with the best appliances. These advantages can only be commanded by the photographic firms that are

largely employed by the public, and have been trained by great practice. It is vain to look for anything like an artistic performance from men who have left some trade or handicraft for the more profitable camera. It is by such hands that the many hideous likenesses to be found in most *carte-de-visite* albums are produced.

In France they have a keen appreciation of the difference between a good and a bad photograph. They produce some of the very best and some of the worst. At the last *Fête* of St. Cloud, near Paris, there was a photographic van placed in a conspicuous position to make a trade of taking *cartes de visite* during the progress of the festival. On the outside of the van was a printed bill containing the following announcement :—

PHOTOGRAPHIC AMBULANTE.

FÊTE DE ST. CLOUD.

CARTES DE VISITE.

La douze.	Air de Famille.	Ressemblance garantie.
3 francs.	5 francs.	8 francs.

Thus the skill of the operator was nicely adjusted to the wants of the sitter. When mere quantity was required, three francs a dozen only were demanded, but a family likeness must be paid for liberally; and for a guaranteed resemblance the highest charge of all was demanded.

Three or four years ago, among the novelties photographers are ever seeking after, what was called the diamond cameo photograph was brought out. The plan consisted in taking four different views of the

face of the sitter on one carte. The photographer employed a small camera and small lens. A simple arrangement within the camera enabled him to expose a section only of the plate at once, which, having received its impression from one portion of the sitter's head, was shifted so as to receive another, and so on until the four were taken. Before being exposed in the printing frame, the negative was covered with a mask of perfectly opaque paper with oval openings, to show neatly and clearly the four pictures to be represented. The object of masking the negative was to protect the intervening space on the slip of the sensitised paper from the action of the light, so that it might appear perfectly white, while the sharp ovals representing the heads were more or less dark, making a striking contrast. The plan did not, however, succeed, for the reason that the sitter did not recognise his own face in some of the positions in which he could not see it in the glass ; hence the fashion speedily died away.

But to return to the carte-de-visite mania. In these days of advertising, when so many people are clever at keeping their names well before the public, it is not to be supposed that the photograph is overlooked. When we scrutinise the scores of faces that gaze upon us from the booksellers' windows we cannot help remarking that some heads are repeated with a pertinacity that is by no means commensurate with their real character. Upon inquiry, such individuals will be found to make capital out of this forced notoriety.

Actresses, in particular, imagine their fame depends upon the profusion with which their cartes de visite appear in public. In cases where the sitter is very celebrated, and is sure to sell well, it is becoming the custom to demand a royalty for the use of the negative. We believe Tom Sayers was the first to set this fashion, just after his famous fight with Heenan. Not only did this worthy sell his "mug," as he termed it, to one of the sporting publishers, but he engaged to give them the sole copyright in it, to the exclusion of all others. But actresses and pugilists are not alone in this desire to be constantly before the public. The pedestrian may recognise the face of more than one clergyman who takes this means of keeping alive his popularity, and we more than suspect some physicians of taking the same course of increasing their practice. It is a refined method of advertising, which cannot well be brought home to the individual; moreover, it has this advantage over the newspaper puff, that its cost is defrayed directly at the public expense.

For the direct and avowed purposes of trade the carte de visite has not been so extensively used as may have been expected. Large numbers are printed for the purpose of showing delicate designs in glass and in gold and silversmiths' work by the Stereoscopic Company—a most legitimate exercise of its use; and it would be well if, as far as advertising purposes were concerned, these useful sun pictures stopped here, but we were lately favoured with an ingenious application of its powers as a begging medium. A card with the

portraits of six children reached our hands, with a printed fly-leaf to the interesting family picture to the following effect :—

“CHILDREN TO SAVE.

“Advertisement sent to a few taken from the ‘London Court Directory.’

“The father of these British-born Protestant children is an elderly gentleman, ruined by competition in business, and past beginning life again; and the mother is in a very precarious state of health. To seek for adopters is against parental instinct; and besides it may ultimately come to that, as by the time their schooling is over, in ten or fifteen years, they would most likely be orphans, and their willing adopters would be welcome to it [*sic*]. At present, the father, in his alarm for the fate of these creatures, seeks for some that would pay, not to the father, but to good boarding-schools, for their clothing, keeping, and tuition; and after school time, see that they should not want. Willing benefactors are therefore requested to state what they would feel inclined to do for each child they may point out by one of the numbers given at the foot, to Alphabet, till called for, at the Post Office, No. 1, Liverpool Street, Moorfields, E.C., enclosing card or addressed envelope, to insure correct address, if a reply should be wished for.”

The children are all duly numbered at the foot of the carte de visite, and the whole affair affords a most ingenious application of the art to the purposes of this new sort of pattern post, setting forth specimens of juvenile raw material. Whether this audacious human cuckoo succeeded in dropping his six little responsibilities into any domestic or scholastic nest we do not know, but the attempt shows that the begging fraternity know the value of photography.

The whole tribe of rogues who feed upon the credulity of mankind have also found out its powers of filling their pockets. The following advertisement

touches a very tender chord, and we have no doubt is greatly successful :—

“Your future husband or wife’s true carte de visite.—Mr. H—, the celebrated astrologer, will send the true carte de visite of your intended, with name, age, and date of marriage, for sixteen stamps. Three questions answered for two shillings and sixpence. State age and sex. Send stamped directed envelope. Address, Mr. H—, — Villa, — Road, Notting Hill, London. Answer in two days.”

This advertisement has appeared in many of the penny papers, and no doubt has eased a considerable number of servant-maids and clerks of their stamps. It must certainly create a sensation in any man’s or woman’s mind to break the seal of the astrologer’s letter, and draw forth the picture of the mate that is to be. It is, in fact, the magic mirror brought home to every door at the smallest possible cost. We must confess, however, that the specimens of promised wives and husbands we have seen have not been such as to tempt others to know their matrimonial fate by return of post.

But photography lends its aid as easily to the rogue-taker as to the rogue. The public may not be aware that there is a photographic album at Scotland Yard, in which may be seen the carte of every ticket-of-leave man in the country. The charitable regulation which allows a convict his liberty before his sentence has expired is burdened with the condition that he must report himself personally once a month to the police authorities wherever he may happen to reside. Before leaving the prison, his photograph is taken by the prison authorities, for the purposes of identification.

It is, of course, for him to resist ; if he does, he is not allowed his liberty. One *carte de visite* is kept in the police album at Scotland Yard, another at the station-house of the division of the metropolis in which he may select to reside, and a third is forwarded to any country district he may wish to remove to. When the *carte de visite* and the prisoner arrive at Scotland Yard, a sergeant of each division of the force is called in to inspect both portrait and sitter, in order the better to identify him by the aid of the little *carte*, in case he should fail to put in an appearance. It is scarcely possible to conceive a *carte* taken under less agreeable circumstances. The ticket-of-leave man's album is, indeed, a strange psychological study. The individual who opens it is prepared to find a villanous portrait gallery of low foreheads ; but his anticipations are by no means verified. Very many heads are those of the ordinary population, no better and no worse. Now and then the odd-shaped head, the curious formation of the eye, the full animal jaw, prove that we are gazing upon men predestined by nature to commit acts of criminal violence, or to perpetrate petty thefts. Sometimes a strikingly handsome countenance appears full of intelligence—be sure that man is a forger, or a delinquent in some of the higher branches of fraud. We asked the superintendent who kindly showed us the book, if any of the police would be justified in taking any man into custody on the strength of the *carte de visite* alone. The reply was guarded: “ Not on the *carte* alone, but certainly after previous identification of the

individual." Appended to each *carte de visite* there is a most graphically-written description of each prisoner, especially of any particular marks he may happen to have about his person. These are powerful aids in identifying any runaway, for there is scarcely a living person that does not possess some mark about the body, not easily obliterated, that would lead to his identification. This is especially the case with the criminal population, and with the class from which convicts generally come. With a strange perversity they are in the habit of pricking in with gunpowder all sorts of marks—suns, stars, anchors, &c.—on the fleshy parts—brands, in fact, which can never afterwards be removed. In this respect they seem altogether to lack the cunning of the lower animals, many of which, as the sportsman well knows, have the tact to hide in "cover" so assimilated to that of their own body that they are overlooked. The scars, again, which men living by violence are sure to carry about them, in many cases make the police officer as certain of his man as the grazier is of sheep.

There are cases, however, in which identification of an absconding rogue by such marks, or even a comparison of his face with a photograph portrait, is out of the question. For instance, when Redpath some years since absconded, there were no means at hand by which the detectives could identify him. It was supposed that his negative would be found in some of the photographic houses, and upon inquiry Mr. Mayall had one. A large number of photographs were printed

and distributed among the police force, and before long he was detected just as he was about to sail from some port in the North of Europe. In this case he was, we are informed, much disguised.

Only a short time since, Mr. Pollaky, the private detective, made a bold stroke by the aid of a *carte de visite*. He was in search of a fraudulent debtor, a Mr. Gray; and one evening, whilst in the Stadt Theatre in Vienna, he recognised a gentleman elegantly dressed who most completely answered the appearance of a photographic portrait in his possession. Without loss of time he arrested him: he turned out to be the veritable man he was in search of, and he afterwards ascertained that he had taken his passage and was about to leave Vienna by the night mail for his port of departure.

A far more interesting group of *carte-de-visite* portraits are those left by friends at the police-office of persons that are missing. Young ladies' portraits in such quarters especially look out of place; but there are many such. One cannot contemplate them without a feeling of pity or commiseration. Some of them have placed shame between themselves and home; some the dark water. We fancy the *carte de visite* is of little avail in such cases.

Viewed commercially, no art matter of modern introduction has made such extraordinary progress as photography; and this may be especially said of that branch of it which relates to *carte-de-visite* portraits. At the present time the sale of these amounts to between sixteen and eighteen millions a year. As we

have said before, the demand at present is nothing like what it was. In the years 1860-62 no less than between three and four million cartes were sold of her Majesty. Sometimes the cartes of illustrious persons, owing to peculiar circumstances, sell at greatly enhanced prices. Thus, when the Prince Consort died, his carte was in great demand at ten shillings each. The execution of the Emperor Maximilian and the assassination of President Lincoln produced a sudden demand for their portraits, with which the supply could scarcely keep pace. But independently of the trade in cartes de visite, a score of other tradesmen have been either greatly stimulated or brought into life by the new art. The demand upon the precious metals, gold and silver, has been very great: enormous quantities of glass are required for the negatives; the same may be said of cards; the making of albums employs thousands of persons. Cabinet-makers have additional employment in making the carved "properties," chairs and tables, garden balustrades, cabinets, that are so plentifully used. The chemists are required to furnish large supplies; the lens-makers have been rendered equally busy; and we may add employment has been afforded to a large amount of labour, very much of which we are glad to see has fallen to young ladies. In short, the introduction of photography generally has marked a new era in the arts and the higher branches of manufacture; and, as far as we can see, is destined to a further development year by year.

Amateurs are not as a rule successful in portrait-

taking, but we must make an exception in favour of a lady, Mrs. Cameron, whose life-size portraits may be seen at Colnaghi's, Charing Cross. These are taken with the large lens, and, without the appearance of art, are yet most artistic portraits. The head of Alfred Tennyson, with its flowing locks, and calm, grand expression, shows us the power of photography in large—if we may so speak. Mrs. Cameron has a fine sense of light and shade, and the heads she has taken remind us of the noble pencilling of Correggio, so grandly are the masses of light and shade disposed.

It is not uncommon, we hear, for some of our best portrait-painters to aid their pencil with photographic life-size sketches of their sitters; and they need not feel shame at allowing Phœbus to be a guide to their brush in the matter of likeness, and in the arrangement of broad effects of light and shade. It has been objected that these life-size portraits are always disagreeable, in consequence of the roughness they give to the skin. This is quite true of photographs taken with a small lens, and afterwards magnified to the life-size; but this difficulty is entirely got over by the use of a large lens, which has scarcely any magnifying power. Mrs. Cameron's portraits are perfectly free from any roughness by reason of her adopting this process; and more lifelike heads than those shown in the windows as specimens of her art we have never witnessed. These large-sized heads, when artistically coloured, are so lifelike that the spectator can scarcely help thinking a living individual is looking at him.

CADGERS AND TRAMPS.

“Big fleas have small fleas
Upon their backs to bite 'em ;
And these fleas have other fleas,
And so on ad infinitum.”

“ONE half the world doesn't know how the other half lives.” The more we see of life, the more we see the truth of this popular saying. The Parliamentary Report on Vagrancy, just out, gives us a picture of the habits and customs of a class of people living in our midst, but of whom we know as little as we do of the savages of the interior of Africa. To an ordinary observer, all classes of English men and women of the more respectable order have certain ideas of living and enjoyment in common. The first nobleman in the land lives in a house, and eats and drinks, and has his duties and responsibilities, like the workman, or the porter at his gate ; in all the essentials of life there is an almost painful uniformity in the manner the various grades of the population spend the twenty-four hours of the day. The curious Blue-book just issued has, however, introduced us to a new tribe of people—a race paying no taxes, calling no man master ; having

no house to cover them, no friends to help them ; feeling no love for any human thing, but a great deal of hate ; buying no food, owning no bed to lie down upon—in short, a people as unproductive and almost as naked as the moment they came into the world. When we hear of the state of society two or three hundred years ago, when certain classes on the borders used to live by levying black-mail, we fancy what extraordinary times they must have been—how unlike our own. The only difference really between those times and these is to be found in the fact that in a lawless time a certain portion of the population took toll of our substance in a lawless manner, whereas now, in a time of law and respect for the rights of others, we have a class who do exactly the same thing in a perfectly lawful manner—nay, we have a most perfect machinery under a national board to further their views and to legalise their plunder. Vagrants, cadgers, and tramps—the poetic temperament has always had a leaning towards this erratic class, and Charles Lamb had more than a sneaking regard for them. To roam about the country, not knowing what adventures may turn up or where you may lay your head, the idea has fired many a lad and lass of a romantic turn in their teens ; but what shall we say to a class of people so devoted to this nomad existence that they continue in it to the latest period of their lives, without having the slightest feeling of romance, and with a full knowledge that the end of every day's ramble will be terminated by a night in the tramp-

ward, passed in a tumultuous fight with all kinds of creeping things, a meal of dry bread in the morning and a basin of skilley, painfully earned by three hours' stone-breaking, oakum-picking, or the cleaning out of water-closets? There certainly is no romance in this, neither is there any adequate recompense in the way of food, one would think, to induce a man to seek such parish hospitality night after night for years together. But that such a class exists, and is, if anything, on the increase, the returns of the Poor-law inspectors testify. That they are for the greater part known to each other, and that they have some mysterious means of inter-communication, is also certain. The chief constable of the city of Chester, writing to Andrew Doyle, Esq., one of the Poor-Law inspectors, gives a curious example of this. "The perfect system of communication among tramps is surprising. I have tested it, and found that about two days are sufficient to promulgate a new regulation, &c., among the fraternity. My test was causing every male to be searched, and burning pipes and tobacco found amongst them. Every professional tramp carries a favourite pipe, and, as a rule, has half an ounce of tobacco per day. After two or three nights, not one of the applicants had either pipe or tobacco, having hidden those luxuries before entering the police-office. The second test was searching for money, and with a like result. Cadgers and tramps generally travel in companies of twos and threes—often a man with his putative wife, and perhaps a child or two. It is their habit, when they have money or any-

thing else about them they do not wish taken away, to leave the things in charge of one of the gang who sleeps outside whilst the others seek admission in the casual ward of the Union." The same writer gives the following curious account of the class of people who apply for this kind of temporary relief. He says: "The public are totally unaware what class of persons apply for this kind of relief. Estimated roughly, I am decidedly of opinion that seventy-five per cent. of them *never* work, but spend their time in tramping from Union to Union. In fact, I have at this moment the names, or rather the nicknames, of between thirty and forty men and women who are known as the 'Long Gang,' and who work Cheshire and North Wales in pairs, visiting Liverpool when they get possession of anything they cannot dispose of safely elsewhere." These tramps generally leave behind them in the workhouses some handwriting on the wall, by which those who come after them are informed of the character of the various workhouses in the neighbourhood. Some of these places have a particularly bad name among the fraternity. Congleton Workhouse, near Sandbach, is thus spoken of in one of these wall inscriptions:—

"Oh, Sanbach, thou art no catch;
For like heavy bread, a —— bad batch,
A nice new suit for all tear-ups,
And stones to break for refractory pups."

The bad and good points are carefully noted in the neighbouring workhouses, just as in towns the traveller records the treatment he has received; the only dif-

ference being that, as a rule, the traveller says nothing but pleasant things—the tramps quite the contrary. Thus, the bare boards of some vagrant wards are distinguished from the good padding of others; and notice is given that in certain Unions named, the “tear-ups” will not get new suits. The term “tear-ups” alludes to those tramps who, before being sent out in the morning, tear up their old rags, which are generally covered with vermin, well knowing that the master of the Union will not send them adrift naked. But this convenient system of obtaining a change of clothes at the expense of the community is sometimes frustrated by the master having old sacks and bags made up for them, in such a manner as to insure decency, but by no means elegant in their fit or general appearance. We have given an example of a condemnatory notice of one workhouse; we now quote a poem in approbation of the Seisdon Union at Trysull:—

“Dry bread in the morning, ditto at night,
Keep up your pecker and make it all right.
Certainly the meals are paltry and mean,
But the beds are nice and clean.
Mind don't tear these beds, sheets, or rugs,
For there are neither lice, fleas, nor bugs
At this clean little Union at Trysull.
But still at the place there is a drawback,
And now I'll put you on the right track;
For I would as soon lodge here as in Piccadilly,
If along with the bread they give a drop of skilly,
At this clean little Union of Trysull.
So I tell you again, treat this place with respect,
And instead of abusing pray do it protect;
For to lodge here one night is certainly a treat,
At this clean little Union at Trysull.”

The writer of this, who signs himself "Bow Street," is certainly a jolly beggar of a humorous turn, and must be a prime favourite among the fraternity. His doggerel is scrawled over many of the workhouses, and he seems to be no more able to keep down his rhyming propensities than he can repress his turn for mendicancy.

Mr. Doyle gives a curious collection of the announcements and appointments he has copied from the workhouse walls in his district; some of them are very curious:—

"Private Notice.—Saucy Harry and his mate will be at Chester to eat their Christmas dinner, when they hope Saucer and the fraternity will meet them at the Union. 14th November, 1865."

"Spanish Jim, the — fool who robbed the two poor — tramps in Clatterbridge Union, were here on the — find it out."

"The Flying Dutchman off the Brum for a summer cruise at the back doors, or any other door."

"Wild Scotty, the celebrated king of the cadgers, is in Newgate, in London, going to be hanged by the neck till he is dead. This is a great fact—*written by his mate.*"

"Never be ashamed of cadging. I was worth five hundred pounds once, and now I am glad to cadge for a penny, or a piece of bread.—
LANKY TOM."

"If rag-tailed Soph stays here (Shiffnal) come on to Chester."

"Shaver here, bound for Salop, to see the Rev. Henry Burton, a most benevolent minister of the Church of England, and may the devil fetch him."

The gentleman is no believer in tramps; hence the polite wish at the end of Shaver's notice.

"Beware of Ludlow,—bare boards—no chuck."

"Bowney will not have none of Prince Charles this winter. He is bound for Westmoreland and Cumberland. All pudding cans in the county: no dirty rags and boards."

"Boys, look here! There's Long Lank working at Warrington for two or three rags of clothes, and taking the bread out of other mouths."

Nothing seems to be so infamous as to work among the fraternity. This Long Lank is the gentleman who tells his mates never to be ashamed of cadging, but he appears to have thought better of it, and is denounced accordingly. Some of these gentlemen find their time hang heavy on their hands just before festive seasons. A fellow who signs himself "Westminster Cockney," for instance, pathetically says, "I don't know where to go, to put over the time until Christmas, but there is too dry service in Yorkshire to please me; I shall take my likeness to Bristol for the next two months." It is customary to regale the inmates of workhouses on that happy day with roast beef and plum-pudding, and we see in the public papers flourishing announcements that certain charitable people have sent money to the workhouses for that purpose. We here see some of the kind of people who lie in wait for such good things. What the meaning of the following announcements can be we leave to the reader's discrimination:—

"Harry Heenan was here, hafter being off the ropes for twelve months. 13th September, 1865."

"The Yorkshire Rodneys coming down into Cheshire to spoil the country, after filing their — guts with good cheese and bacon.— BUTTERMILK."

The irrepressible "Bow Street," who seems to have made acquaintance with all the Unions in this district at least, evidently has a vein of humour and a touch of sarcasm in him which would have earned for him a

better livelihood in the literary world, we should think, than padding the hoof can do. Here, for instance, are a few words from his pen, worthy of some of the jolly scoundrels in the old dramatists: "Bow Street and two other ragamuffins slept here on the night of the 12th of April, and was quite shocked at the clownish impudence of the old pauper at the lodge. The thundering old thief denied us a drink of water. So help me Bob;" and then he adds, with a rare vein of irony, "What noble institutions these Poor-Law Unions are; and how they succour distress, opening arms—— Yes, over the left: plenty of pump, but little grub, and a nice warm breakfast in the morning. Don't you wish you may get it?" But there is a dismal touch about this vagabond, which proves that his genius is versatile as well as jolly. Perhaps, for the sake of enjoying a little solitude and reflection after the freedom of the cadger life, he graduated for a prison; and we find him thus apostrophising it in a strain too lifelike not to be drawn from personal experience:—

"A PRISON.

"No sun, no moon,
No morn, no night,
No sky, no earthly blue,
No distant-looking view,
No road, no street,
No tother side the way,
No dawn, no dusk,
No proper time of day,
No end to any row,
No top to any steeple,
No indication where to go,
No sight of familiar people,
No cheerfulness, no healthy ease,

No butterflies,
Nor yet no bees."

After that, who shall say there are no Laureates among the beggars? "Bow Street," however, is a very remarkable exception—a ne'er-do-well, possibly, of a better class, who loves vagrancy for itself. The majority of the tramps and casuals are simply rogues and vagabonds, who never have worked, and never would, even if it were offered them. It is a singular feature in human nature, that a distinct class should exist who beg their way through life with a labour and an earnestness that would insure them good wages in any honest occupation. A poor, wretched-looking creature, clothed in filthy rags, with two or three miserable children dragging behind her, will now and then be seen trudging along the road on a rainy day accompanied by a low-browed tramp, who whines for halfpence in a voice that you know is simulated, and could in a minute be exchanged for oaths and blasphemies. The broken victuals, and the coppers they collect, and the buggy bed of the casual ward at night, with skilly and cold water for breakfast, make up the sumptuous fare upon which they live from year's end to year's end. What can there be in this gipsy, roving life to give zest to such a manner of passing one's days? It will, perhaps, be said that begging is a more profitable occupation than we imagine, or that the cadger enjoys his orgies now and then as well as his betters.* Granted, but in the long

* Blind beggars, we know, live sumptuously, earning large sums daily, through the compassion of the kind-hearted public, which they

run the life must be hard—far ~~harder~~ than that of the labourer who lives by the sweat of his brow. We can only account for the strange life of the cadger on the supposition that he really possesses some Bohemian blood in him, which irresistibly leads him to wander, beg, and steal. We know that likenesses to ancestors that have lived generations back now and then come up in families. Why may not the tramp inherit a taint of vagrancy from his great-great-grandfather? It must be a disease of the blood, as it is too hard a life to be selected from choice. The late Charles Buller—who looked upon the cadging tribe as a class of rogues and vagabonds who lived upon the charity of weak people in the daytime, and on the hospitality of the Poor-Law guardians at night—endeavoured to put an end to their indiscriminate relief by the promulgation of the following rules:—

“1. The refusal of relief to all able-bodied young men who, in the opinion of the relieving officers or the masters of workhouses, were not actually destitute.

“2. The exacting of a task-work suitable to the capacity of the casual poor who are relieved.

“3. The employment of police officers as assistant relieving-officers.

“4. Requiring the production of passes or certifi-

spend on mere animal enjoyments. Many of the fellows we see tapping their sticks along Regent Street, if followed home, would be found eating their rump steaks, drinking the best stout, and waited upon by a couple of “doxies.” It is a fortune to a cadger to lose his eyes.

cates, except **under** exceptional circumstances, from all those who applied for relief as casual poor."

These rules worked well during the lifetime of Mr. Buller, especially the one systematically refusing relief to professional tramps; but with his death they fell into disuse, and any applicant is now considered entitled to relief if he is not found to be in possession of money. The evidence of nearly all the Poor-Law inspectors is in favour of reverting to the plan of employing the police as relieving-officers. It may be feared that, by so doing, the deserving casual poor may be confounded with the worthless tramps and cadgers, who now form three-fourths of those who apply for relief.* If this were the case, it would of course be a fatal objection, inasmuch as we have no right to place any of the deserving poor under police surveillance. But those who have had any experience of the two classes can no more confound them than a veterinary surgeon could confound a pony with a donkey. A cadger and professional tramp is self-conscious; he is betrayed by his tone of voice, his clothes, his very walk. There is no remnant of that independence which is always observable in the casual poor walking from place to place in search of work. Under the

* The letters of "An Amateur Casual," published in a contemporary, had the singular effect of calling forth a perfect crowd of persons anxious to contribute to the journals their experience of work-house life. Among these, to the writer's knowledge, were a clergyman and a medical man, both of whom partook of the hospitality of the guardians. The letters of some of these casuals prove that they have been well educated, and that no class is safe from the descent into pauperism.

present state of things, indeed, this deserving class scarcely ever apply to the workhouse for a night's lodging, unless they are in the last extremity of want. The brutal language, the fearful vermin,* and the indecent conduct of many of these wretches make our workhouses too loathsome for the most destitute of the honest poor, and they prefer to seek shelter in low lodging-houses rather than endure it.

Mr. Doyle, the Poor-Law inspector, makes an excellent proposition. He suggests that a classification should be made of the casuals demanding admittance. The true cadger should be turned over to the attentions of the police relieving-officer, and the deserving poor should be received and lodged in a separate room. A return might advantageously be made, he thinks, to the old form of certificate of character. "The deserving class of poor may be furnished with such evidence of their character and circumstances as might afford a fair presumption of the truth of their plea of destitution. A wayfarer of this class might, at the place where the cause of destitution occurs, be enabled, by those who are cognizant of it, to obtain a certificate from some proper authority, setting forth his name, the cause of destitution, and the object of the journey." The "casual" bearing such a certificate, as Mr. Doyle

* In the refuges for casuals supported by voluntary contributions in the metropolis a very expeditious method is adopted of getting rid of vermin. The applicants for relief are put into a warm bath; meanwhile their clothes are baked in an oven. If the Poor-Law authorities were to imitate this simple process, there would be more comfort and fewer "tear-ups."

justly observes, should be entitled to some better treatment than the mere cadger who will not work. It certainly is a monstrous thing that an honest but destitute traveller should be subjected to the treatment which is invented to deter the professional tramp. A poor starving creature in search of work is certainly entitled to better fare than a hunch of dry bread (often mouldy) and water for supper, and skilly or gruel for breakfast. Moreover, they should not be subjected to the temptations these cadgers put in their way. What should we say to the authorities of a hospital who placed physically-depressed creatures, suffering also from mental fear, in the wards of a cholera hospital, cheek by jowl with poor creatures in a state of collapse? Yet this is just what we do by our present regulations, morally speaking, with our travelling poor. When they are at the lowest point of Fortune's wheel, we place them for the night in the company of the cadger, who boasts his earnings by day, and tempts them by the tales he tells of their vagabond life. Can it be wondered at that so many poor creatures fall victims to the teaching the law throws in their way?

If the cadger class could be banished from our work-houses, there would be ample funds for giving a good meal to the destitute traveller, without increasing the rates by one penny. The cadger is the human wolf of this century—the creature that eats up our substance without making any return for it, unless it be to tear up his clothes, or burn the wheat-rick, out of revenge for some fancied slight on the part of the master of the

workhouse ; and, like the wolf which used to eat up our mutton, he should be ruthlessly destroyed. But our Poor-Law management seems to have fallen into a fearful state of neglect. Immense sums are paid in the form of rates annually, and those for whom they are raised get no benefit from the money. Like our Admiralty and our Army, enormous sums are thrown away on establishments and the machinery of a bad system ; and just as in the case of those establishments, which can neither furnish us with ships, sailors, nor soldiers, our workhouses are so managed that the deserving poor, for whom the relief they afford was intended, avoid their doors as they would the gates of a prison. But even the machinery and rules for casual relief afford a specimen of disorder and want of system which can scarcely be matched in any other national institution in the country. Having to do with the same class of worthless tramps, who wander from one end of the kingdom to the other, one would naturally think that the same rules as to lodging, feeding, and task-work would be carried out. Nothing of the kind. Every workhouse manages these matters as it likes ; there appears to be no adequate general supervision ; and one is lost in wonder as to what may be the labours of the Poor-Law Board, and what the nature of the duties of that exalted individual, the President of that Board.

In some Unions no labour is demanded of the vagrant in return for his food and lodging ; in others he is put to work three hours before receiving it. In

some no food is given; in others (Penrith), only on Sundays! In other points there is the greatest diversity: $3\frac{1}{2}$ ounces of bread are given in some Unions; 16 ounces in another, night and morning. In some, milk; in others, pea-soup; in some, gruel or skilly. In the Bala Union the tramp gets porridge, treacle, 8 ounces of bread, 3 ounces of cheese, 7 ounces of bread, $1\frac{1}{2}$ pint of gruel, and $\frac{1}{2}$ an ounce of treacle for supper and breakfast. At Bridgnorth they get only bread and water! In short, there is far more diversity as regards the quantity and quality of the food in our different workhouses than travellers find in our hotels; and we are obliged to say there is the same diversity in the bedding. Some have bare boards, inclined at an angle, to sleep upon, with rugs to cover them; others have only straw mattresses, with rugs and blankets. To some is accorded the luxury of iron bedsteads, with mattresses, sheets, and rugs. There is a fire in some vagrant wards; in the majority, none at all. In some places the sleepers have no covering! In short, the housing, feeding, and employment of tramps is a regular hodge-podge, and the tramps know it, and "spot" those houses which are to be avoided or frequented, as we have said before. The consequence is, that whilst some Unions never see a tramp, others are regular houses of call, by which the equality of the burden thrown upon the ratepayers may be imagined. If the relief were alike all over the country, things would be more equalised, and the "Bow Street" worthies would no longer be able to find any theme

for sprightly verse. It is probable that, if policemen were made assistant relieving-officers, the tramp would be driven to open courses of thieving; but this would be better than his present unsatisfactory state—a nominal wayfarer, but an active rogue, succoured by the Poor Law, as at present administered, instead of being punished, as he would be if deprived of that eleemosynary assistance which he takes out of the mouths of the really deserving travellers.

That we shall always have among us a certain number of professional beggars, as long as there are so many givers, we by no means doubt; but they should not, at least, be fostered in their laziness by the resources of the State. They have organisation enough, without such aid, as it is.

We are all of us familiar with the cadger's map, published as a frontispiece to the little volume, the "Slang Dictionary," and we mark the manner in which the houses of charitable people are hieroglyphically indicated, and *vice versâ*. There is one practical remark anent this custom we wish to make. If the reader has ever given anything to a tramp, and then finds him making any mark upon his premises, let him rub it out at the first convenient opportunity, unless he wishes to be the victim of perpetual morning calls by this class of people. If he has given nothing, let him cherish such marks as they may make, as they will certainly not be to his advantage in a charitable sense, although they may be in a financial sense.

A late writer in *Notes and Queries* throws much light

upon mendicant freemasonry. He says: "Let any one examine the entranees to the passages in any town, and there he will find chalk marks—unintelligible to him, but significant enough to beggars. If a thousand towns were examined, the same marks will be found at every passage entrance. The passage mark is a cipher with a twisted tail: in some cases the tail projects into the passage; in others, outwardly—thus seeming to indicate whether the houses down the passage are worth calling at or not. Almost every door has its mark: these are varied. In some cases there is a cross on the brickwork; in others, a cipher. The figures 1, 2, 3, are also used. Every person may test for himself the accuracy of these statements by the examination of the brickwork near his own doorway—thus demonstrating that mendicity is a regular trade, carried out upon a system calculated to save time, and realise the largest profits." It is only in provincial towns these marks are to be found, however, as Londoners are considered to be too "fly" (experienced) to be taken in by them. We have heard of a clergyman who, having learned the meanings of these signs, turns them against the beggars, by making, on the piers of his parsonage gate, the signs of gammy (unfavourable, mind the dog), and flummuxed (sure of a month in gaol), and as a consequence no cadgers or beggars ever trouble him. There are no "Bow Street" poets out of doors, as within the walls of the Union, but a mysterious language is certainly prevalent, which they partly borrow from the gipsies, who undoubtedly

adopted hieroglyphic signs, even in England, in times past, in order to give private information to each other by handwriting on the wall.

In conclusion, may we not remark that, when Dean Swift penned the droll lines at the head of this article, his prophetic eye must have seen the cadger in all his modern vigour? For this creature not only preys upon the better classes, but is a miserable parasite, stealing the substance even from the most destitute.

INDIAN TEXTILE FABRICS.

THE people of India at the present time number at least two hundred million souls, affording, in the language of the commercial world, a "splendid market" for the looms of England. If it were incumbent upon us to clothe all these people, our machinery, it is scarcely necessary to say, would be utterly inadequate to perform the task. But there is no such necessity, India in many fabrics need not depend upon her foreign lord; indeed, the servant in many respects is called upon to supply the master. Whilst it is admitted that in all matters of art the native has a much purer taste than the British manufacturer, yet we suspect it will be a surprise to the latter to be told that many Indian calicoes are both superior and cheaper than those imported from England. Of course this is not the rule, as we may know from the very large amount of cotton goods manufactured annually for the Indian market. Large as this importation is, those who have lived in India will not be surprised to hear that it is diminishing. We have treated the natives, who were intelligent manufacturers long before the light of civilisation had reached these islands, just as

we treated South Sea islanders: the most barbarous designs, the most flaring colours, the most adulterated materials are thought good enough for the “d——d niggers,” as they are termed by some young puppies in regimentals, just fresh from school. The natural result is, that British manufactures of any pretence to art are avoided most cautiously by all the better classes of India. When we are told that our colours will not wash, or that they are so loaded with size that they become mildewed on the voyage, that the variegated face of damask is imitated by stamping the pattern upon the size with which they are plastered, it is no wonder that we are losing our footing in our own dependency, and that even Prussia is supplanting us in dyed goods.

Great as is the damage to our credit brought about by such frauds, there is a still more disastrous source of loss to us in our ignorance of the wants of the natives, and our failure to appreciate their art requirements, which are always based upon refined taste. Our manufacturers seem to think that because the native is scantily clothed he is little better than a savage; the real fact being that the Hindoo possesses a delicacy of organisation and an instinctive appreciation of appropriate form and colour in design, which are wholly foreign to the nature of the thick-fingered Anglo-Saxon. A native, with a rude bamboo loom, will with his fingers and toes finish a piece of muslin which cannot, by all the application of our most delicate machinery, be produced in Europe.

Clearly, then, there is a physiological reason why our effort to compete with them is a failure in the more delicate fields of operation, but there are other fields that remain open if we will only fit ourselves to the task. In the cheaper calicoes we are, of course, unrivalled; but immediately we attempt print goods for the Indian market, the inflexible nature of the Briton comes out. Forgetting the difference in climate, the nature of the garment, &c., he persists in sending out patterns which may delight the eye of Molly the cook, but which sorely offend a people trained for thousands of years to the appreciation of the pure and simple in design and to the subdued harmonies of colour.

It has long been clear that our manufacturers are very inadequately informed as to the requirements of her Majesty's Indian subjects. Indeed, their ignorance is inevitable. The distance of this great dependency renders the market a sealed book to our manufacturers in the best sense of the term. Our productions would sell in almost unlimited quantities, if the Manchester manufacturers took the same care to consult the tastes of the Hindoos as they take to consult the markets of the Continent. The Government of India, in the interests of commerce, have just taken a step which it is hoped will diffuse amongst our manufacturers a juster view of Indian wants, and among the natives themselves a more accurate estimate of the requirements of Europeans. In order to bring about this reciprocal benefit it has caused a set of volumes, containing working specimens of all the textile fabrics of India, to

be distributed throughout the great capitals of our textile manufacturing districts, and, together with these, a volume containing photographic sketches of the different Indian tribes, habited in the peculiar and diverse fashions of the East. Upon the nature of the garment worn depends, more or less, the nature of the ornamentation required. A print which may be admirably adapted for a trouser pattern—for many of the natives wear trousers, good reader—may be utterly unsuitable for a *saree*, or the scarf-like wrapper which forms the whole body and head dress of a large portion of the native women. Again, the turban is folded in the East in wonderfully diverse manners. Here, again, texture of material as well as ornamentation has to be consulted. In some turbans as many as sixty yards of material are employed; hence the necessity for great lightness in the fabric used for this purpose. It is also necessary for the manufacturer to know that the clothing of nearly the whole Hindoo race consists of mere wrappers wound round the body. Needle and thread are therefore not required in making them up. The Mahomedans, on the other hand, of the better class, use made-up clothes—jackets and trousers. These differences of race and religion require to be known in order to fabricate materials suitable to the market. A pattern that may suit a tunic, for instance, would be utterly out of place in a waist-cloth or a turban. As a rule, the natives like small patterns, and the reason is obvious. A garment that is worn folded would cut a large pattern, and make it look utterly

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ridiculous. Checks and tartans are in much request in India; indeed, the natives have copied many of our English plaids—a proof that they are not averse to those European designs which fulfil their own ideas of what is fit. If we wish to succeed in securing the Indian market, we must give them what they like, and not what we may imagine will be suitable for them; and once secured, the trade is likely to last, for there is nothing more remarkable in the tastes as regards dress of that vast country than their fixity. The Hindoo does not look for spring, summer, and winter dresses, as we do here. The *dicta* of dressmakers do not change in a week the style of the make, or the colour of the costume. Many of the patterns now worn are the same as they were centuries ago. The simplicity of the costume, no doubt, has much to do with this fixity—or, in other words, the unvarying mind of the people finds its expression in dress as in all other matters. This conservatism is of the utmost importance to the manufacturer. A pattern happily caught, a combination of colours once accepted, he may go on for years with the certainty that the market will not cry out for a new design. He has only to know the appropriate lengths and breadths of the scarf-like articles of dress generally used, and he may go on making them for centuries, for there are no fashionable tailors or milliners to interfere with him. As the material leaves the loom it is ready to be worn.

It may not be uninteresting to give a sketch of the nature of the garments—male and female—that have

been for ages, now are, and probably will be for ages to come, used as the costume of the vast majority of the native population. The simplest and the commonest article is the *dhotee*, or waist-cloth. It is almost universally a white cotton scarf wound round the loins, and then brought up between the legs. In some cases the *dhotee* is so small as barely to fulfil the purposes of decency. It is scarcely necessary to say that this scanty costume is worn only by the working-classes and the poorest people. Nevertheless, such is the population of India, that even to supply these insignificant garments the looms of Lancashire would have to be doubled. The *longee* is a scarf worn over the shoulder and upper part of the body. This article of dress is made of silk as well as cotton, and it is ornamented in both materials with gold. The *dhotee*, on the contrary, is invariably made of the softest cotton, and as it requires to be constantly washed, it is rarely ornamented. This, with the turban, comprises the sum of the dress of the working population. The *saree* of the women, as we have said, is still more comprehensive, as it serves for body garment and head-dress at the same time. The native women array themselves very gracefully in the *saree*. Its ample folds can be turned to the purposes of coquetry with great skill, and the agile fingers of a dark beauty can arrange the dress with such quickness and art, that we are told by a gentleman who has been in India, they often change the garment in public places after bathing without the slightest impropriety—slipping off the

wet *saree* and replacing it with a dry one without exposing the skin in the smallest degree.

Cotton being the material mostly in use, it seems extraordinary that our power-looms should not have swept away the rude hand-looms of the natives; but this, we are told, is far from being the case. Indian cotton goods are much softer, we are told, than the English make. This is a matter of great importance to a sensitive people like the Hindoo; it is more porous, moreover a very necessary quality in the tropics, where so much moisture is perpetually passing off by way of the skin. There are certain colours again that are favourites in these body garments, and the method of ornamentation with gold is a matter respecting which the natives are very fastidious.

But in these matters of detail the most ample information is given in the seven hundred working patterns to be found in the volumes provided for the manufacturer by the Indian Government. If he goes wrong after the pains that have been taken to put him in the right path, the fault is his own.

But whilst the larger market is for the kind of garments that leave the loom ready for use, there is still a great demand for jackets, coats, and trousers, worn by men, and for bodices, trousers, and skirts or petticoats, worn by women. The Mahomedans have always worn these articles of dress, and in course of time their example has been sparingly followed even by the Hindoos. These articles of dress do not quite answer to those worn in Europe; but they are made

with needle and thread, and have a general resemblance to those worn by ourselves. In these latter kind of dresses we have not hitherto competed with the native manufacturers. They are in most cases ornamented, in some instances very richly so, and here the Oriental is our master; and if we hope ever to compete with him we must sit patiently at his feet, and learn the lesson which he seems to have acquired by some instinct of his nature. The sun—that great natural institution of the East—no doubt has much to do with the native's aptitude for dealing with colour. The first thing that strikes the European in looking at a collection of Indian fabrics is the sobriety and harmony of hue which they present. But if we only consider for a moment, we shall see how this comes about in the most natural manner. If English or French dyes were used, they would reflect so much light as to be unendurable. The dead look of Indian colours is fully compensated by the superfluity of light in which they are seen. Take a Coventry ribbon, a blue for instance, and place it beside an Indian ribbon; the first appears the brighter and more cheerful in this country; but under an Indian sun its garish tone would be intolerable, whilst the Indian blue would be, comparatively speaking, cool and refreshing. But there is something more than the deadness which strikes us as peculiar to Indian tints—their tones are wholly different. Their green is by no means the same mixture of blue and yellow as with us; the same with their purples and oranges. Again, their primaries are different; their whole chromatic scale, in

short, is pitched a note or two lower. All these niceties our manufacturers must patiently acquire if they desire to serve the upper ten million in India. For our part, we scarcely dare to hope they will ever succeed; the sources of the art lie deep in the very nature of the Indian mind and climate. We believe there is but one kind of dyed goods that we have ever succeeded in making palatable to Orientals, and that one is "Turkey red," which still sells extensively in the East; we are not certain, however, whether it is much used in India proper: the East is a wide field, and covers the peoples in the Indian Archipelago, China, and Japan, all of whom are far inferior, artistically, to the Hindoos.

But we may be customers to India for their fabrics to a very much larger extent than we are at present, if we fail to imitate them for the Indian market. As a rule we look upon them, as we do upon a Cashmere shawl, as articles *de luxe*, beyond the means of the middle classes. This is true of the rarer qualities of these precious fabrics, but by no means true of a very large portion of them. Dacca muslins, for instance, have long been imported into the country, and might be used far more generally than they are. The highest qualities of this fabric are splendid examples of the superiority of intelligent labour over the most elaborate machinery. The native woman spins with the finger a yarn which surpasses in fineness the trophies of machine-spun yarn paraded in the Great Exhibition of 1862 as a marvel of European skill. There is a class of muslin termed "woven air," the fabric of which is

so marvellously fine, that the Hindoos themselves are fond of relating all kinds of strange tales respecting it.

Mr. Bolt, in his "Considerations of the Affairs of India," speaking of the Dacca muslins, says that, according to report, the Emperor Aurungzebe once "was angry with his daughter for showing her skin through her clothes, whereupon the young princess remonstrated, in her justification, that she had seven *jamahs*, or suits, on : another tale was to the effect that, "in the Nabob Allaverdy Khawn's time, a weaver was chastised and turned out of the city of Dacca for his neglect in not preventing his cow from eating up a piece of 'Abrovan,' which he had spread and left upon the grass,"—the muslin, of course, being so fine that the animal could not see it upon the herbage.

The "woven air," or "king's muslin," was formerly made only for persons of distinction, and to order. Since so many of the native courts have been swept away—and especially since the Great Mogul has disappeared from the scene—this high-class muslin has not been made in any quantities; but still there is a sufficient demand to keep the art of making it from falling into disuse.

So delicate is the manufacture of the short staple of the Dacca cotton, that it can only be woven into yarn at certain times of the day. The morning is generally so employed before the dew has left the grass: if spinning is carried on after that time, the spinner, who is always a woman under thirty years of age, spins the yarn over a pan of water, the evaporation of which

affords sufficient moisture to prevent the fibres from becoming too brittle to handle. Delicate as the muslin is, it will wash, which European muslins will not. The durability of the Dacca muslin, notwithstanding its surprising fineness—a piece of “evening dew,” one yard wide and four yards long, only weighing 566 grains—is said to be owing to the greater number of twists given to the Dacca yarn, as compared with the finest muslin yarns of England or France. The time taken to spin and weave the threads in a piece of “woven air” is very great; the reader will not, therefore, be surprised to hear that it sells at the rate of a guinea a yard.

The “Abrovan,” or “Running-water,” is considered the second class of muslin; Sabuam, or Evening-dew, is the third quality. It is so called because it is so fine that it can scarcely be distinguished from dew upon the grass. There are several other very fine Dacca muslins that are known by distinctive names, but the three so poetically designated are the most famous. The *dagh-dhobees*, who remove iron-mould from this precious material, use the juice of the amroold plant for that purpose; and to remove other spots or stains, a composition of ghee, lime, and mineral alkali. There are Mahomedans who also repair this “woven air” with a skill equal to that of the Hindoo who weaves it. For instance, it is said an expert *rafuger*, or darning, “can extract a thread twenty yards long from a piece of the finest muslin of the same dimensions, and replace it with one of the finest quality.” It is said that

they execute their finest work under the influence of opium.

A still more exquisite and expensive work of the Indian loom is the figured muslin. A piece of this fabric, measuring twenty yards, made in 1776, cost as much as £56. The splendid yet subdued effect of weaving gold and silver thread into the different fabrics made in India has never even been approached by Europeans. Some of their silks have a sheen upon them like the breast of a pigeon, or indeed of the Impeyan pheasant. In nature we never find that even the most splendid effects offend the eye by appearing gairish. The Indian artist seems to have caught the very art there is in nature, and he uses his gold and silver with a caution, a prodigality, and an economy fitted for the occasion. The native never throws away gold where it will not be seen. Thus in the turban-cloth only the end that hangs down by the neck is so ornamented, in the waist-cloth the fringed end, &c. The gold thread is so very pure that it never tarnishes, and it *washes* just as well as the other threads of the garment. The thread of the precious metals is called *kullabutoon*, and is manufactured wholly by hand. Captain Meadows Taylor gives the following description of its manufacture:—"For gold thread a piece of silver, about the length and thickness of a man's forefinger, is gilded at least three times heavily with the purest gold, all alloy being previously discharged from the silver. This piece of gilt silver is beaten out to the size of a stout wire, and is then drawn through suc-

cessive holes in a steel plate until the wire is literally as thin as a hair. The gilding is not disturbed by this process, and the wire finally appears as if of fine gold. It is then flattened in an extremely delicate and skilful manner. The workman, seated before a small and highly-polished steel anvil, about two inches broad, with a steel plate, in which there are two or three holes, set opposite to him and perpendicular to the anvil, and draws through these holes as many wires—two or three, as it may be—by a motion of the finger and thumb of his left hand, striking them rapidly but firmly with a steel hammer, the face of which is also polished like that of the anvil. This flattens the wire perfectly; and such is the skill of manipulation, that no portion of the wire escapes the blows of the hammer, the action of drawing the wire, rapid as it is, being adjusted to the length which will be covered by the face of the hammer in its descent. No system of rollers or other machinery could probably insure the same effect, whether of extreme thinness of the flattened wire, or its softness and ductility." This flattened wire is then wound round silk thread, and is ready for use. This affords another example of the fact that intelligent human labour can always excel the work of the most elaborate machinery. The hand is educated to a delicacy of touch that is marvellous, and that delicacy is transmitted through succeeding generations, until the native manipulator acquires a kind of instinctive aptness which gives him all the unfailing regularity of a machine directed by the intelligence of man. The

embroidery on the woven garments in which this absolutely pure gold is employed never tarnishes. An instance of the value of using nothing but the pure metal was afforded at the late Dublin Exhibition. Several Irish poplins, in which gold and silver thread were used, had to be changed during the progress of the Exhibition on account of their becoming so tarnished, whereas the gold-embroidered fabrics of India there exhibited retained their lustre unimpaired throughout. If Dr. Forbes Watson, by his labours in pointing out this fact to our manufacturers, can get them to imitate the truthfulness of the native artisan, he will deserve their warmest thanks, and if he can induce the dyers to send nothing to India that the *dhobie* can wash out by his rough method of manipulating with stones upon the washboard, India will reap the benefit of European science and skill, which at present she holds at little worth, in this matter at least. The native has found out the way to print fast colours, and Dr. Forbes Watson has been at the trouble of indicating them to our manufacturers; but there are some other people besides the Hindoos who are difficult to move from their old methods of doing things. The machinery of Manchester certainly prints better than the native can do with his rough methods; but even here a certain variety is given by the handwork which in some measure makes it more agreeable to the eye than the monotonous repetition of the same exact form produced by machinery.

With the Indian embroideries every lady is well

acquainted. The price of labour is so cheap in India, that there is no reason why she may not export a very much larger amount of this kind of work than she does. Lace, again, is work just suited to the patient fingers of the Hindoo women. We understand the fabrication of it has lately been introduced into that country, and it is likely to succeed admirably.

But we must come at last to that article of attire which is in every woman's thoughts—the Cashmere shawl. We are told that, in consequence of a famine which occurred in Cashmere, a great number of so-called Cashmere shawls are now made within our own territory. The Report of the Lahore Central Committee for the last International Exhibition states that, with respect to shawl manufacture,—

“This is now by far the most important manufacture in the Punjab; but thirty years ago it was almost entirely confined to Cashmere. At the period alluded to, a terrible famine visited Cashmere, and in consequence numbers of the shawl weavers emigrated to the Punjab, and settled in Umritsur, Nurpur, Dinangar, Tilaknath, Jelalpur, and Loodianah, in all of which places the manufacture continues to flourish. The best shawls of Punjab manufacture are made in Umritsur, which is also an emporium of the shawl trade. But (and we must entreat the attention of the ladies to what follows) none of the shawls made in the Punjab can compete with the best shawls made in Cashmere itself; first, because the Punjab manufacturers are unable to obtain the finest species of wool,

and secondly, by reason of the inferiority of the dyeing, the excellence of which in Cashmere is attributed to some chemical peculiarity in the water. The wool, on which the purity of the shawl depends, is from the domestic goat of Thibet, whence it is exported, *via* Yarkanal, to Cashmere. The wool is called pashum, and is the fine growth that lies under the hair and close to the skin. Many animals in cold countries have a similar kind of wool underneath the hair. The camel, the yak, and the shepherd's dog also have this winter under-clothing, which they cast off in the summer; but in neither of these animals is it so fine or of such good colour for dyeing purposes as that of the shawl goat. The Cashmere emigrants, not being able to obtain the true wool, use the best they can get in place of it, and the result is, that European firms have lately been complaining of the adulterations of the texture of the Cashmere shawls. This is done by mixing up Kirmanhee wool with real pashum. It is now sought to provide against this falsification by forming a guild of trades in these shawls, which shall have the power of affixing on all genuine shawls a trade-mark, guaranteeing it to be genuine pashum, and fixing a heavy penalty on all counterfeits." We trust our statement has not rendered any lady suspicious of the integrity of her Cashmere; but we confess that when we hear of the price, even at the place of manufacture, of the genuine article, we look with some suspicion on the so-called Cashmeres that we sometimes see in the windows of the London dealers in them. We are told

that "a woven shawl of the best materials, and weighing seven pounds, will cost in Cashmere as much as £300. Of this amount the cost of the materials, including thread, is £30; the wages of labour, £100; miscellaneous expenses, £50; duty, £50." If we add to this the cost of carriage to England and insurance, it will be clear that very few will be able to afford such costly garments, even in this country of nobles and merchant princes.

The Cashmere shawl is really a warm garment, but what keeps out the cold also keeps out the heat. There are plenty of warm fabrics made in the northern parts India, and many of the woollen garments are very much like our Scotch plaids, even to the pattern. It must refresh the eye of the Highlander to see in these far-distant lands garments that remind him of his home, and it shows that, under like conditions, the results of human nature are wonderfully similar. We cannot conclude this article more appropriately than by recommending the manufacturers who would aspire to feed the almost limitless market of India to visit the Indian Museum, Whitehall, where he will find a most curious collection of fabrics, procured with great care by the Government from all parts of India, and where he may learn all the details he requires from Dr. Forbes Watson, who has made the subject of the textile manufactures of the people in India his study, and by his writings has done good work in bringing the customers of both countries in contact with each other to their mutual advantage and enrichment.

BODILY REPAIRS.

THE perfection of the handiwork of Nature leads us to ignore her wonderful adaptation of means to an end. The easy working of the human frame seems to us a matter of course, and we take no note of the wonderful mechanism by which it is brought about. If any person, however, has the misfortune to lose a limb, and seeks to supply it by some mechanical appliance, he becomes too painfully aware of what a bungler man is. In the shop-windows of the artificial limb makers what well-proportioned legs we see—what dainty hands! Where mere form is concerned, Dame Nature is often outdone, and many a man would willingly exchange his ill-shapen natural member for one fashioned by a cunning artist in orthopraxy; but when it is put to the test—there's the rub. The human hand is, perhaps, the most beautiful natural machine in existence; there is no form of motion it is incapable of. When we think of the number of muscles that are brought into play to guide the burine of the line-engraver, one marvels at the delicacy of the machinery; yet the same implement, when wielded by the prize-fighter, would knock down an ox without

injury to its delicate construction. In its beautiful adjustment to all kinds of work, it can only be compared with the organ of vision.

Curious to see what art is capable of accomplishing in imitation of this perfect work, I called upon a well-known artificial limb-maker in order to inspect his hands. Oh, what a falling off was there! The ordinary substitute supplied to those who have had the misfortune to lose the natural member is a very simple affair, carved out of light wood, with hinged finger-joints and a thumb which, by the action of a spring, bends in upon the palm. This artificial digit, clothed with a neatly-fitting glove, presents a very tolerable appearance; by the aid of the spring thumb, carefully adjusted by the other hand, it can grip a roll of paper; but there its capabilities end. The attendant, noticing my disappointment, candidly confessed that the hand was only for ornament, adding, "We recommend our patients, when they really wish to use the arm, to unsocket the hand and put it in their pockets." I could scarcely help smiling at the idea of a gentleman at a dinner-party quietly pocketing his hand, and with due deliberation adjusting a spoon or fork into his stump. It appears that there is a regular set of domestic implements manufactured for this purpose, which fit into the socket, just as implements are fitted into a centrebit. Poor men who cannot afford this assortment are simply fitted with a hook, which enables them to lift weights or to hold a rein; or the sportsman is fitted with a gun-rest, which enables him

to do a day's shooting without inconvenience. It must not be supposed that attempts, vain and impotent enough, it is true, have not been made to follow the mechanism of Nature more faithfully. A celebrated artificial limb-maker tells us:—"Some years since I devised a hand which, by a series of concealed cords and springs, possessed the power of grasping and retaining with some slight amount of force any light substance placed in contact with it, the governing power being the fall of a small column of mercury placed in a tube within the arm part of the apparatus. The object I had in view was that the elbow being flexed, and the lower arm being placed at an inclined plane, the gravity of the quicksilver, acting upon a kind of plug to which the centre cord was attached, should at once produce a closure of the fingers, whilst the return of the mercury to the lower end of the tube, upon the arm being lowered, would permit slight springs to bring back the fingers to their starting-point. This plan did not succeed, as the joints had to be made so loose that they gained lateral motion, thus giving anything but a natural appearance to the fingers; and the metal, in spite of every care taken to secure it, continually escaping, rendered useless the contrivance."

One of the highest efforts of mechanical genius in this direction was that called forth by M. Roger, who had the misfortune to lose his right arm below the elbow. This serious disability would have prevented his following his profession, were it not that the loss

fired the ambition of a young Prussian to supply him with a limb that would serve the purpose of "histrionic declamation." It strikes one that the movements of operatic singers are so purely mechanical as a rule, that the task was not so difficult after all. Be that as it may, however, M. von Peterson has won the admiration of all the practitioners in his art by making an arm and hand which could not only give the well-known operatic flourish, but which enabled M. Roger to grasp and draw a sword from its scabbard! The machinery by which this end was brought about may do very well for the opera, but I fear it is by far too complicated for ordinary life. We are told, indeed, that "Von Peterson's arm is not easily distinguished from the natural member, *particularly if the wearer carry it with address.*" One wonders if in his histrionic performances he is enabled to shake his artificial member *con espressione*. When it is necessary, on account of some injury, to amputate any portion of the hand, great care is now taken to leave as much of the sound part as possible. By means of a finger and thumb it is easy to attach other digits which enable the sufferer to give them motion, so that a pen, pencil, or fork is readily grasped.

Perhaps the most extraordinary work of art in aid of a natural misfortune is one that has just been accomplished by our highest artist in the manufacture of artificial limbs, Mr. Bigg. A poor woman, shortly after her confinement, lost by gangrene both feet and hands; in fact, she was reduced almost to a living torso,

with the exception that a portion of the stumps of the legs and arms was left. To use his own words in the *Lancet* :—

“For the legs, he devised a strong, though yielding, leather sheath, which surrounds the thighs, and receives the weight of the patient when standing. To these leather cylinders lateral steel rods are attached, having an axis for the movement of the knee, this axis being so fixed as to carry the centre of motion well behind the natural axis of the articulation, thus giving stability when the patient stands erect or walks, but not interfering with the natural movement of the knee-joint. The stumps themselves are received into carefully-fitted troughs, lined with soft leather, and having the form of the leg exteriorly. There is a shapely foot, and the ankle is formed by a single ball-and-socket joint, upon an ingenious principle which Mr. Bigg has patented. This joint enables the patient to rest in easy equilibrium upon the feet, and gives a singular facility of motion in walking. The legs are fastened to the body by elastic straps, joined to a linen pelvic belt.”

The hands were constructed upon an original principle :—

“The idea was suggested to Mr. Bigg by the hand invented by Count de Beaufort. In this hand the thumb alone is moved, the motion being obtained by a catgut cord, which passes over the opposite shoulder. The plan is very inconvenient and awkward, and Mr. Bigg has improved upon it by giving motion to the thumbs of the hands, in the case under consideration, by a cord ingeniously fastened to a small stud forming part of the artificial elbow-joint. Two of the fingers (the index and middle) in Mr. Bigg’s artificial hand also partake in the movement. By this arrangement, the patient, on simply extending the arm, opens the fingers in a position fitted for grasping easily small articles.”

The poor woman, by means of these appliances, is enabled to use both extremities with remarkable skill ; she is able to pick up articles even as small as a pin, to feed herself, to use her knife and fork with ease, and to use a pocket-handkerchief. She already crochets with ease ; indeed, we shall not be surprised if Mr. Bigg

were to exhibit some drawings from her mock fingers as an example of his genius, as she already holds a pencil with ease and writes tolerably. She walks well upon her artificial feet without support, and is, on the whole, the most extraordinary specimen of a human being half made by nature and half by man.

The lower limb has been far more successfully imitated than the upper extremity. The Anglesea leg was in its day considered a wonder of art, and when the Marquis was on horseback, few recognised the fact that it was artificial: the catgut hid at the back of the heel served to extend the foot when the limb was straightened, and the spring in the instep uplifted the toes from the ground when the leg was flexed in walking; but the action of the foot is utterly wanting in lateral motion in the ankle-joint, consequently the wearer could not walk on uneven ground without considerable jar and strain. Moreover, the metal joints creak and rattle after a little time, and the approach of the wearer is thus unpleasantly heralded. In all such jointed extremities the wearers are obliged to carry pocket oil-cans: occasionally the knee-joint has to be lubricated—a most comic performance. A great improvement has been made upon this famous leg by giving it a ball-and-socket ankle-joint, which imparts every motion that is obtainable in the human joint, and by means of the use of railroad-car spring rubber, which acts by compression, the danger of breakage is got rid of. This leg, which is an American invention, is of course a very expensive affair, and can only be

afforded by the wealthy, but another American has come into the field with a leg fitted with a solid india-rubber foot, which gives the mobility required in walking, and great stability to the wearer. In America they have a practical method of making known any new discovery, and the inventor of this artificial limb—Dr. Marks—thought no better judgment of the pudding could be obtained than in the eating; consequently, at the American Institute Fair, he started a cripple race. The *New York Tribune* thus reports this novel affair in its issue for October 16, 1865:—"The race-course consisted of the centre aisle of the Fair building, and the match was a walk down its entire length. Three gentlemen entered the lists, and gave a specimen of their facility in walking on these substitutes for natural legs. The first contestant, Mr. Bates, was a tall, heavy man, over six feet high, and weighing over two hundred pounds. He wore a pair of artificial legs he had used less than three weeks, and therefore walked somewhat unsteadily. The second competitor, Mr. Auzburger, followed, wearing but one artificial leg. He walked a fourth of a mile without a cane in four minutes, with apparent ease, and was warmly applauded. Mr. Frank Stewart closed the performance, wearing two artificial legs, applied just below the knee. He walked a half-mile in nine minutes without a cane, and with so much spirit and naturalness that he was frequently obstructed and taken hold of by persons who could not believe that he wore two artificial legs; and he was finally obliged to take the

large stand, and exhibit the legs and feet to the audience, when he was loudly applauded."

The Governments, both of England and America, furnish those officers of the army and navy who have been maimed in action with artificial limbs free of cost, if they apply for them. The American officer gets one of Dr. Bly's clever imitations of the natural limb; whilst the soldier or sailor, instead of the Chelsea pensioner, or bucket and stump, we are familiar with at home, obtains one of these economical jointed legs, with india-rubber feet, which the competitors in the race proved to be so serviceable. Whilst such limbs can be made at a moderate cost, it is certainly hard that our old veterans should have to stump about on their wooden pegs. But I suppose the argument of our Admiralty would be that they have such a quantity in stock at Greenwich Hospital, that they must have them used up. Hands are now made by the Americans of rubber, and though the feel is not exactly that of real flesh and blood, it is at least better than the wooden digit. But the artificial limb-makers honestly give up the hand, confessing Nature is a mechanician in this item that cannot be competed with.

A man, now and then, has the misfortune to lose his nose. What would be the greatest conqueror that ever lived without this useful appendage? Many a man would as soon lose his life as his nose; hence the skill that is exerted to supply its place when lost. Of old, the organ was modelled, as far as possible, in the form of the old member, and then the permanent

structure was shaped out of beaten silver, which was enamelled so as to match the complexion. The metal proboscis was commonly secured to the face by means of a pair of spectacles, which skilfully hid the line of juncture. There was one advantage in this artificial nose—it needed no pocket-handkerchief; but then, it suffered the drawback of possessing no power of smell. Gutta-percha has lately been used in place of metal; but, by means of the rhinoplastic operation, the skilled surgeon has of late years taken all repairs of the face out of the hands of the orthopractic artist. The surgeon calls in Dame Nature to his aid at once. Having made a figure in wash-leather of the amount of skin required to form the new member, he marks the triangular outline upon the patient's forehead, with its base upwards. He now dissects the skin down to the bone, lifting the cellular tissue, together with all the blood-vessels that nourish it. The stump, or so much of the nose as is retained, having been pared down so as to give a good shape, the flap of skin is twisted upon itself just between the brows, so as to maintain the circulation, and then it is fastened upon the superstructure by sutures. In a few days adhesion takes place, the circulation is thoroughly re-established, and a very fair proboscis is the result.

Hare lip, apertures in the cheek, are now repaired at the smallest notice, with admirable results. In short, the skilled operator thinks no more of shifting patches of skin about from one part of the frame to another adjacent, than the gardener thinks of re-sodding

a bare place in the grass-plot. Even lips are made, but not in this manner. Where these have to be restored, the modeller is called in, who models the feature in silver, and colours it. In these days of artificial heightening by colour, even this deception may pass muster ; but all attempts at kissing must be left out, for obvious reasons.

A very ingenious method is adopted of repairing the hearing, when there has been no loss or rupture of the drum of the ear. It often happens that the shell or folds of skin which form the outward ear is defective. Some cunning craftsman, noting this, has contrived to mould flowers so that they shall fit into the opening of the ear. I saw a pair of convolvuli thus fitted, and so fastened with wires that they looked like adornments of the head-dress, and, no doubt, were very useful in collecting the sound and directing it upon the auditory nerve.

We think we have shown that art is capable of repairing—after a fashion, it is true—every conceivable damage to the outward form ; but it is just as far as ever, however, from attempting to imitate the living principle within. The smallest nerve fibre, the minutest artery, show a workmanship he never even dreams of copying. Nature keeps her secret, and will continue to do so till the end of time.

HOMES WITHOUT HANDS.

THE Rev. J. G. Wood, the writer of the ingenious work under this title, seems to possess the gift—much cultivated, though but rarely attained—of translating the labours of the scientific into the language of every-day life. The scientific man proper scorns to condescend to the crowd; he invents a nomenclature at which the ordinary mind recoils as a dog recoils from a hedgehog. The zoologist is, perhaps, from the very nature of his subject, less open to this charge than others of his class, for the reason that he must deal with natural objects of which all of us have some knowledge; but even he is apt to lock up his knowledge in technical language, the key to which but few of us have time to find. Let us be thankful, then, at meeting with one who is clever enough to perceive that we are, all of us, children in the matter of natural wonders. Surrounded as we are by domesticated animals, so few of which show any inclination to provide themselves with habitations of any kind, we little dream of the wonderful variety of houses built without hands which exists among the lower animals. The strangest part

of the business is that the higher we ascend in the scale of the animal creation the less seems to be the desire to provide these houses. The larger and more powerful the mammal, possibly the less necessity to seek a burrow or to construct a habitation, even for the protection of its young; but it does seem strange that we must descend to the insect class, and even to the zoophytes, to seek for the most elaborate and the most beautiful builders. The smaller the brain, the better the art; the more insignificant the creature, the more curious its habitation. Indeed, we may say that exactly in proportion to the minuteness of the worker is the gigantic nature of the work he produces. As a class, the higher order of mammals can scarcely be called builders at all; even man himself, in his most degraded condition, is only a burrower; and if we were to judge of the intelligence of the Bushman merely by his power of making a home, we should place him below the mole. It must not be supposed, then, for a moment that the house-building power is a measure of the intelligence of the animal. It is the result rather of a wonderful and unreasoning instinct. There is not the less cause, however, for our astonishment. What is instinct but a kind of stereotyped reason, given to the first created thing, and transmitted to the latest, without increase or diminution?

We may gather from the title of this work the general aim of its author, but in his preface he gives us a succinct account of the arrangement he has adopted:—

"Beginning with the simplest and most natural form of habitation, a burrow in the ground, the work proceeds in the following order :— (2) Those creatures that suspend their homes in the air ; (3) those that are real builders, forming their domiciles of mud, stones, sticks, and similar materials ; (4) those which make their habitations beneath the surface of the water, whether salt or fresh ; (5) those that live socially in communities ; (6) those which are parasitic upon animals or plants ; (7) those which build on branches."

The mole, the most conspicuous member of the first class, is evidently a great favourite with Mr. Wood. He looks upon it not only as the typical burrowing mammal, but as the best representative of the antediluvian race of animals :—

"The enormous shoulder-blades projecting far above the spine ; the short, bowed, and powerful bones of the fore limbs ; the wide, flattened palms ; and the strong, sharp, and curved claws, look almost like a miniature model of some machine invented for the purpose of tearing the stubborn earth."

Of his wonderful powers as an excavator there can be no doubt. We see in many fields the whole surface covered with earth heaps ; these are sometimes supposed to be the nests of the creature ; they, in fact, are but the earth thrown up here and there in the progress of the subterranean shaft he is driving—a lesson in engineering we see followed by our navvies in tunnel-making. The real home is hidden under a much higher hill, cunningly concealed under a tree or in a bank. A section of this hill shows with what consummate art and cunning this "home without hands" is made by a poor blind creature :—

"The central apartment, or keep, if we may so term it, is merely a spherical chamber, the roof of which is nearly on a level with the earth around the hill, and therefore situated at a considerable depth from

the apex of the heap. Around this keep are driven two circular passages or galleries—one just level with the ceiling, and the other at some height above. The upper circle is much smaller than the lower. Five short descending passages connect the galleries with each other; but the only entrance into the keep is from the upper gallery, out of which three passages lead into the ceiling of the keep. It will be seen, therefore, that when a mole enters the house from one of the tunnels he has first to get into the lower gallery, to ascend thence to the upper gallery, and so descend into the keep. There is, however, another entrance into the keep below. A passage dips downwards from the centre of the chamber, and then, taking a curve upwards, opens into one of the larger tunnels, or high roads, as they have been appropriately termed."

This is all very curious, but a far more curious fact still connected with this clever little workman is, that he drives his tunnels wonderfully straight. Herein he seems to possess some instinct which gives him the advantage of the human engineer, who requires the aid of a theodolite and levels, and has to work from air-shaft to air-shaft above ground before he can drive his level true. But the mole appears not only to be the most perfect burrower of his class, but to possess a physical energy and a fury which, according to Mr. Wood, surpass those of all other animals. No one looking at the sleek, dull, little mole would credit it with such astounding vigour, and this is only another example of the false ideas we gain by judging of animals by stuffed specimens, which rarely give even the true form, much less afford any indications of the fiery spirit within. The largest of all the burrowing mammals is the Arctic bear, and this animal, in the season of incubation, teaches man a lesson which he has never appeared to profit by, otherwise we should never hear of persons perishing in the snow. The bear houses

himself by simply scraping out a hole in the snow under the shelter of some stone or tree, and then quietly lying down and allowing the falling flakes to cover him. The snow is a good non-conductor, and he speedily finds himself in a self-made cavern, formed by the partial melting and then the solidification of the snow. He reverses, in fact, the devices of the Wenham Lake Ice Company, who preserve their cold ice blocks in woolly blankets, while the bear keeps his own furry blanket warm by wrapping it in a mantle of snow. The warmth of this cave is so great that the creature's breath absolutely keeps open a connection with the upper air, the breathing-hole never filling up, but simply becoming hoar-frosted at the sides by the congelation of the breath. Here the bear brings up its tender cubs, remaining for three months, rearing its young on the accumulation of fat it has stored upon its body previous to its accouchement. It is a very curious fact that during this partial hibernation the intestines are plugged up by a hard concreted substance called "the tappen," which would appear to keep the animal in condition, as it is asserted that when, from any cause, the "tappen" is cast, the bear speedily becomes terribly thin and weak. This is a fact the physiologist may possibly be able to turn to some account. The operation of burrowing is the simplest of all operations, and one which the mammals share with nearly all the creatures in the chain of life. The birds are notable burrowers, as we may see by any cliff in which the sand marten dwells; the reptiles are,

many of them, great burrowers, as we know by the manner in which the tortoise disappears for the winter in our gardens; but the reader will perhaps be surprised to hear of burrowing molluscs. One can scarcely imagine a creature that looks less likely to perform this operation than the snail, yet there is every reason to believe that a little mollusc, resembling the common banded snail of our hedges, really bores, not in the earth, but into hard rock. There is a hard calcareous rock in a little wood in Picardy, called Le Bois des Roches, in which these snails have bored their way at the rate of half an inch per annum. It is supposed that the hole is made by an acid secretion proceeding from its foot. There is another burrowing mollusc, the *Pholas*, which is a material agent in the disintegration of our rocky cliffs. This creature tunnels the chalk cliffs in every direction, and even makes its way into limestone by the action of its fragile shell, which is ridged and rough in places, like a file, and by working this tool from right to left and back again, it manages to sink deep tunnels in the rocks, and no doubt it is a very active agent in those vast changes which are going on along our sea-coasts. The *Tero navalis*, or ship-worm, the terror of the shipwright, is another very important burrower; but we mention it because Mr. Wood, with his usual love of putting forward the lower animals as the instructors of man, refers to this creature's shell-lined burrow as having given the idea to Sir I. Brunel from which he constructed his boring shield used in the Thames Tunnel.

It is certainly a curious fact in natural history that the methods of constructing homes by no means depend upon the form and nature of the animal forming them. We have seen that the burrowers are to be found among every class of the animal creation, from the bear down to the lowest mollusc or worm. No matter what may be the form of the living instrument with which they build, yet they all possess in common the simple idea of burrowing a hole. We would take the next form of habitation—the pensile, or hanging-nest builders, but the range over which Mr. Wood has to travel is so vast that we cannot afford to linger over this branch, as the far more curious class of true builders awaits us. The Zoological Gardens, which are, in fact, a living zoological museum, contain two specimens of building birds which are perhaps the most curious of their class—the *Talegalla*, or brush turkey, and the bower-bird. As most of our readers have seen the singular nest and playing-place of these birds, we need scarcely dwell upon them at length. The nest of the brush turkey, which looks more like a small haystack than an ordinary nest, is constructed in a very methodical manner:—

“Tracing a circle of considerable radius, the birds begin to travel round it, continually grasping with their huge feet the leaves and grasses and dead twigs which are lying about, and flinging them inwards towards the centre. Each time that they complete their round they narrow their circle, so that in a short time they clear away a circular belt, having in its centre a low irregular mass. By repeating the same process, however, they decrease the diameter of the mound as they increase its height, and at last a large and rudely-conical mound is formed.”

In this nest as many as a bushel of eggs are deposited, at regular intervals, long end downwards. The leaves form a fermenting mass, which proves a veritable eccaleobion, that relieves the mother of the necessity of sitting upon them. The male, however, has duties to perform which cannot be neglected. He has to regulate the temperature of the mass, which would otherwise get too hot. This he does in the same manner as the farmer prevents the haystack overheating. The bird makes a central ventilating shaft, which carries off the superfluous heat, and, lest the temperature should fall too low, he is constantly engaged in covering and uncovering the eggs in order to hit the exact temperature. Thus this singular bird is not only a true builder, but a cook, applying the heat with the nicest discrimination until the egg is warmed into life. The bower-bird, also in the Gardens, is a still stranger builder, as she appears to construct her bower, not for the purpose of containing the egg, but to attract the other sex. This bower is constructed of bent twigs, the ends of which are inserted in the ground by the bird, each twig being bent hollow, like the ribs of a ship. This bower, which is from one to two feet long, is used as a promenade by the female bird; it is, in short, her boudoir, and just as ladies decorate their drawing-rooms with bright articles and odd things, however ugly as long as they are curious, so does the bower-bird decorate her playing-place with bits of coloured cloth, coloured glass, bits of bone—in short, anything she can lay hold of. Indeed, like the magpie,

she is a great thief, and when the native Australian loses anything, the first thing he does is to search the playing-place of the bower-bird, if one is to be found in his neighbourhood. A bird builder, who constructs not for mere coquetry, but for the more serious business of life, is the red-breasted hornbill. Specimens of this bird are to be seen in the Zoological Gardens ; but, as far as we know, it has never exhibited its peculiar powers as a nest-builder there. In fact, the female can scarcely be said to build, but to be built up. Its nest is generally constructed in the hollow of a tree, and immediately the period of incubation begins the male bird deliberately sets to work to wall-up the aperture in the tree, leaving the female bird only a small slit through which it can receive air and nourishment, which the male bird supplies. In this confinement it remains until the young birds are fit to take wing, when the opening is broken away by the powerful beak of the lord and master, and his mate and young ones liberated. Thus the bird has to endure a real confinement while its brood is being reared—a fact unique in the accouchement of birds. Mr. Wood says that the hornbills of Africa and America behave in this particular in exactly the same manner, although they are widely distinct in the zoological system.

But the really wonderful builders belong to the insect tribe, and especially to those of ant-like appearance. The termite, or white ant of Africa, so called, although it really belongs to an order of insects allied

to the dragon-flies, ant-lions, and May-flies, is, perhaps, the most extraordinary land-building insect:—

“Although made merely of clay, the walls are made nearly as hard as stone, and quite as hard as the brick of which villa residences are usually built. The form of the nest is essentially conical, a large cone occupying the centre, and smaller ones being grouped around it, like pinnacles round a Gothic spire.”

Mr. Anderson, in his work “Lake Ngami,” tells us that he has seen nests quite 20 feet high, with a circumference of 100 feet. The walls are so strong that hunters are accustomed to mount upon them when looking out for game; even the wild buffalo does the like. We may, therefore, imagine the strength of dwellings which are capable of bearing the great weight of these huge beasts. Notwithstanding the strength of these buildings, the natives remorselessly break into them for the purpose of eating the inmates, which they consider a great luxury. Mr. Anderson, for instance, once wishing to impress upon a native chief the delicacy of European cookery, spread some apricot jam on some bread and offered it to him. The chief could not deny the merits of the jam, but asserted that it was not equal to the flavour of termites. The mode of catching the termite is very simple. The natives knock a hole in the wall of the nest, upon which thousands of insects immediately throng to the breach to repair it, when they are swept into the vessel the native has prepared to receive them. With the power of this creature to destroy vegetable fibre of every description we have long been familiar through our Indian experience. Mr. Wood, who, as we have said, is so fond of comparing

the labours of the lower order of animals with those of man, should not have forgotten the termites. What are the Pyramids, which we boast of as such stupendous monuments of human labour, compared with the myriads of anthills produced by these tiny creatures? Take the average height of a man, and then the height of the tallest Pyramid, and the labour employed upon its construction falls into insignificance when we think of these anthills, 20 feet high and 100 feet in circumference, built by these little fellows; and the comparison of the amount of mere physical labour becomes the more astoundingly in favour of the insect when we remember that every grain of mud is carried into its place by its own locomotive powers, without engines or tools of any kind but its strong jaws. True, the termite is a sociable insect, and all of this class possess an organisation which is, in fact, a labour-saving power, but in this particular he is far outmatched by the human being himself.

But let us break for a moment the very curious and interesting collection of facts respecting ants gathered by Mr. Wood, in order to refer to a subaqueous nest-builder, which appears to present features of more extraordinary interest than any we have yet related. The cunning and ingenuity of the spider tribe we are all familiar with; but few of us, acquainted as we are with the proceedings of aquatic insects through our vivariums, have yet witnessed the extraordinary proceedings of the water spider (*Argyrosetra aquatica*). This little invertebrata is an air-breather, and the

puzzle among naturalists long was as to the manner in which he managed to live under the water. His nest, it was perceived, was a fine, silk-woven domicile, egg-shaped, with an opening from below—a diving-bell, in fact, which was kept dry by the constant supply of atmospheric air with which it was provided. We should have gone on guessing in the wild way not peculiar to naturalists possibly to the end of time, had not Mr. Bell, an ingenious member of the cult, determined to leave off guessing and to watch. Accordingly, having procured several specimens of this spider, he placed them in glass vessels, when they immediately commenced building their beautiful oval cells, about the size of an acorn. The process of supplying the cell with air the naturalist thus describes:—

“After much preliminary preparation it ascended to the surface and obtained a bubble of air, with which it immediately and quickly descended, and the bubble was disengaged from the body and left in connection with the web. As the nest was on one side in contact with the glass, enclosed in an angle formed by two leaves of the stratiotes, I could easily observe all its movements. . . . In this way no less than fourteen journeys were performed,—sometimes two or three very quickly one after another. . . . The manner in which the animal possesses itself of the bubble of air is very curious, and, as far as I know, has never been exactly described. It ascends to the surface slowly, assisted by a thread attached to the leaf, or other support below, and to the surface of the water. As soon as it comes near the surface it turns, with the extremity of the abdomen upwards, and exposes a portion of the body to the air for an instant; then with a jerk it snatches, as it were, a bubble of air, which is not only attached to the hairs which cover the abdomen, but is held on by the two hinder legs, which are crossed at an acute angle near their extremity, this crossing of the legs taking place at the instant the bubble is seized. The little creature then descends more rapidly and regains its cell, always by the same route, turns the abdomen within, and disengages the bubble.”

If the spider only possessed the further ingenuity to turn its ascending thread into a pipe, in communication with the air, there would have been the diving-bell complete, but just this one little item more was left to the ingenuity of man. There is another spider that builds a raft, upon which it floats hither and thither as the wind blows it along the stream—a kind of pirate, seeking its prey among the water insects within its reach. From its floating home it rushes out upon the water in pursuit of any living thing that falls within its ken, just as human pirates do to this day in the Eastern seas. There are many animals and insects, however, whose constructions are evidently intended rather as snares than as homes, and among these those of the spider tribes are clearly conspicuous. There is one little creature, however, the ermine moth, which is particularly interesting at the present moment, inasmuch as its ravages have been very perceptible during the spring of the present year in the neighbourhood of London. Those who dwell in the suburbs cannot fail to have noticed the extraordinary manner in which all the hawthorn trees and hedges, and even the apple trees, have been denuded of their leaves by what, at a distance, appeared to have been a blight. On a closer inspection, however, it was seen to have been occasioned by a multitude of small black caterpillars, enclosed in a fine network woven between the branches. This singular creature belongs to the sociable class of insects. There is a hedge in one of the enclosures belonging to a square in Notting Hill which was eaten

bare by these marauders, which moved in regular order from one end to the other, and when they had arrived at the end of the iron railing by which they had progressed, they were seen to descend and make their way to another enclosure, just as a line of ants would have done. Mr. Wood tells us that these little creatures are known as tent dwellers, and asserts that their immunity from destruction by the birds is owing to the fear the feathered tribe entertain for the web or tent in which they live. We know what a protection a few cotton threads are to seeds and young peas, and possibly Mr. Wood is right in his conjecture. The most conspicuous member of the social mammalia is, undoubtedly, the beaver, of whose habits we know more since the pair have taken to build their lodge in the Zoological Gardens than, perhaps, we ever knew before; we need not, therefore, ransack this famous store-house of facts for further curious information. There is a singular circumstance, however, related with reference to the habitation of another well-known creature—the hive bee—the typical social insect builder residing among us—which is curious, and deserves to be noticed. The economy of space in the hive, resulting from the peculiar form of the cell, having struck philosophers, it occurred to Réaumur to ask Kœnig, the mathematician, to make the following calculation:—Given an hexagonal vessel terminated by three lozenge-shaped plates, what are the angles which would give the greatest amount of space with the least amount of material? The answer of the *savant* was 109 deg.

26 min. and 70 deg. 34 min. This was considered highly satisfactory and conclusive, as it was so nearly exactly the measurement of the cell that it was thought the bee had solved the problem, making allowance for the little difference there must be in the construction of so small an object, and mathematicians were delighted that theoretical science had thus coincided with the practical instincts of the bee. But there was one hard-headed Scotchman who thought, in a mathematical question, absolute precision was a necessity, and he therefore determined to make the calculation himself, when he found that the true theoretical angles were 109 deg. 28 min. and 70 deg. 32 min., which is the exact measurement of the bee cell. The question now naturally arose how so excellent a mathematician as Kœnig could have blundered so.

"On investigation it was found that no blame attached to Kœnig, but the error lay in the book of logarithms which he used. Thus a mistake in a mathematical work was accidentally discovered by measuring the angles of a bee cell—a mistake sufficiently great to have caused the loss of a ship, whose captain happened to use a copy of the same logarithm tables for calculating his longitude."

Our space will not allow us to follow Mr. Wood much further in his most interesting history of "Homes without Hands," but we cannot leave his charming work without referring to two species of ants—the Driver Ant and the Foraging Ant. Some of the facts connected with these creatures are so remarkable that they scarcely seem credible. The Driver Ant of Western Africa takes its name from the alleged terror that all the lower animals appear to have of it. It is said to march in

long columns, in regular order, which appear to be under the command of officers. This long column eats its way through every living thing it comes across, and whole villages on its approach take to the water. The natives even say that the great Python is in such dread of these creatures that when it has crushed its prey it takes a circle of twelve miles round about to see if the ants are upon their march, and, if so, it abandons it, well knowing that it will soon be devoured by them, and possibly itself also, as the ants attack the largest serpents, as the Cyclops was attacked, by first destroying its eyes. This little creature, we are told, actually performs the feat monkeys were once said to have done, viz., to cross rivers on their march by clinging on to one another, and thus making a chain which is carried forward to the opposite bank, thus improvising a suspension bridge, along which the main body creeps. We are not told by Mr. Wood whether these ants ever build nests—they appear to be too migratory, and eat too much to be able to live long in any one spot. They are said, however, to be killed instantly by the direct rays of the sun, which necessitates their making a covered way — sometimes of great length—in order to travel in the daytime where there is no natural shelter. The Foraging Ant of South America seems to be the friend of man, and is welcomed by the inhabitants as a means of cleansing their dwellings of the thousands of noxious things that are always to be found lurking in houses in tropical climates.

"As soon as the pittas are seen approaching, the inhabitants throw open every box and drawer in the house; so as to allow the ants access into every crevice, and then retire from the premises. Presently the vanguard of the column approaches; a few scouts precede the general body, and seem to inspect the premises and ascertain whether they are worth a search. The long column then pours in, and is soon dispersed over the house. The scene that then ensues is described as most singular. The ants penetrate into corners, peer into each crevice, and speedily haul out any unfortunate creature that is lurking therein. Great cockroaches are dragged unwillingly away, being pulled in front by four or five ants, and pushed from behind by as many more. The rats and mice speedily succumb to the onslaught of their myriad foes; the snakes and lizards fare no better; and even the formidable weapons of the scorpion and centipede are overcome by these pertinacious foes."

With this extract we must close Mr. Wood's singularly interesting volume. It does not pretend to much original research or observation; indeed, it treats of the wonderful instincts of animals spread over the entire globe. It cannot, therefore, be anything but a compilation; but it is done with so much skill that in all probability it will put many a now little-known work on zoology into circulation which otherwise would have been confined to the comparatively confined class of naturalists. The profuse illustrations with which the work is furnished impart an additional charm to this wonder-book. In natural history we are but children of a larger growth, and the curious woodcuts which meet us at every page will open wide other eyes than those of our little ones. Mr. Wood is continually referring us to the British Museum for specimens of some of the more singular examples of "Homes without Hands." The Government has supplemented the floral world at Kew with a museum of natural curiosities

cognate to the living collection. What a gain it would be to a zoological garden to possess such a collection of natural objects as that stowed away in the National Museum, where they are rarely seen, and where they take up so much room that could be better occupied !

THE ART OF LIGHTING A FIRE.

IN these days of rapid progress we so soon become used to changes that we are apt to forget the rate at which we have advanced. If, however, we take some familiar object and contrast its method of production now with what it was thirty years ago, the greatness of the stride we have taken becomes at once apparent. Sitting by the fire the other afternoon, we could not help recurring to a period only a little more than a quarter of a century ago, when the process of producing that great necessity of life was one of the missions of servantalism. In our bachelorhood we have all of us probably experienced, once or twice, this minor misery, which stood at the threshold of the housemaid's work every day of her life. Looking back at the old tinder-box of our boyhood is like looking back at the old wheel-lock muskets we see in the Tower. On one or two occasions, when starting by the mail, the miseries of making a fire—that middle passage to a desolate breakfast in chambers—was indelibly imprinted in our memory. The difficulty of hitting the flint against the steel with due accuracy and force, and the chances of abrading the knuckles in this act, in the

darkness of a winter's morning, are things the youngest of this generation are charmingly ignorant of; and then, when the priceless spark was obtained, the unhappy Prometheus either had the mortification of seeing "people and parson going out of church," or of blowing the light tinder into his eyes in his endeavours to make it kindle. What a piece of barbarism was the sulphur-match! There are old women now in the street who thrust these abominations, done up fan-wise, in your face, evidently with the idea of proving how old they are. But these preliminary agonies were small compared with the attempt to light the rough faggot-wood of a past age, often damp, and always too bulky to seize and retain the fire applied to it. When we recollect all these dismal preparations which Betty had to encounter in years past, and then compare them for a moment with the manner in which things are made easy to our abigails, we see that civilisation is not confined to a class, and that science is at work to lighten the drudgery of the servant as energetically as it is to increase the comforts and enjoyments of the prince. Who invented the first lucifer-match? We do not mean that abortive nitric-acid bottle and phosphorus match that have often burned everything about them as they produced a light, but the clean little lucifer. How is it that we know nothing of the man who saves millions all over the world endless trouble, whilst we are so eager to cumber our market-places with statues of obese aldermen and purse-proud bankers?

What a subject for a poetical statue—the chemist

striking the first lucifer ! And yet that great step in advance has now become "the light of other days." The very facility of lighting the old lucifer was a certain cause of danger. A match accidentally fallen on the ground and trodden upon has lost many a lightly-clothed girl her life, and the insurance companies know but too well what losses they have sustained by the ease with which fire is thus placed at the disposal of the mischievous boy. A large majority, for instance, of the fires which occur in hay and wheat stacks are attributed by the actuaries of the fire-offices to the mere love of idle boys to see a big blaze. Two or three matches are to be found in every country lad's pocket, and the ease with which they can be applied generally renders the discovery of an incendiary fire almost impossible. Ordinary matches are also liable to spontaneous combustion, and the wax matches are often lit by mice gnawing at the wax until they reach the phosphorus. We well remember hearing the late Mr. Braidwood abuse these little implements as the most destructive things of the age, and they were destructive to health as well as to life and property. Matches are made in immense quantities, especially in Vienna, chiefly by children. Whilst the wooden match is being dipped in the phosphorus, fumes of that substance are given off which produce necrosis of the jaw ; in other words, the bone is killed, and a great sloughing ulcer, with a total break-down of the constitution, is the result—drawbacks these of no ordinary nature to the value of the invention, great as it is. But a patent safety

match has just been brought into use which is not made of phosphorus, and which will not ignite by mere friction, although it blazes instantaneously when it is applied to the chemically-prepared surface on the bottom of the box in which it is contained. It is, in truth, the perfection of a match, without smell of any kind, and its unignitability by mere friction will save the country much property now wilfully destroyed, and humanity much deplorable suffering, for we shall hear no more of necrosis of the jaw. These matches have made us digress, however, and we shall never light our fire at this rate. Our fire-wood, like the match, is now a manufactured article, produced with skill and thought. The old faggot cut by the woodman is seen no more in towns, and even in country places gentlemen find it cheaper to procure the patent fuel from London than to have it cut in their own woods. We recently paid a visit to the Patent Fuel Factory at Wharf Road, City Road, and there we were much surprised to enter a large room which resounded with the whirr of wheels and the clinking of machinery. The article called a fire-wheel differs as much from the old faggot as the sulphur match did from the lucifer; it is, in fact, a highly-civilised article, which has to go through many processes to bring it to perfection. In the first place, nothing but the very best pine wood, free from knots, is employed. We dare not say how many cargoes of this wood are brought to London annually to supply its fires; but if we were to hint at a fleet as big as that which took the allied armies to Sebastopol, we should

not be far out. This wood is cut to the proper lengths by powerful steam saw-mills, working night and day, and then it is split and stoved. The successful lighting of a fire depends upon the perfect desiccation of the wood as much as anything ; this is obtained by drying it with a great heat—to such a heat, in fact, that it becomes surrounded with a kind of gas, which leaps, as it were, to meet the fire applied to it. The ordinary fire-wood is sold in bundles, as the reader must be aware ; but the “ wheel ” is built up in the shape of a wheel in the most ingenious manner. The builders are young girls, rows of whom are seen employed in the factory, each girl having an iron matrix of the shape of a wheel before her. Into this matrix she drops with the utmost rapidity sufficient pieces of wood to make the rim and the spokes of her miniature wheel ; by the aid of a lever, the different parts are jammed close, lifted a little from its matrix, and tied firmly together with string. Some of the more nimble of the girls will thus build thousands of these wheels during working hours. The last process is to dip them in a caldron of boiling resin, and the patent fuel is complete. A fire cannot well go out when this patent fuel is employed, as it lights with the utmost ease, burns with fury, and gives out sufficient heat to boil a kettle ; indeed, a large quantity is used by bachelors for this purpose.

We cannot, indeed, say that coal differs in these days from what it did thirty years ago, when sulphur matches and faggot-wood were in vogue, for Nature has perfected this manufacture for herself ; we have arrived,

therefore, at the end of the various materials which compose the fire. Yet to put these materials together so as to make the fire burn is a work of art in its way. How many fires do we see refuse to burn notwithstanding all the aids to conflagration the age has provided us with ! The ordinary plan adopted by a London servant to light a fire is to ram a large piece of paper into the bottom of the grate, spread a layer of sticks on the top—their ends resting fan-wise on the bar—and then to shovel a mass of coal on the top of all. This plan, as a rule, succeeds, it is true, but it is apt to fail, for this reason,—the sticks burn out rapidly, and then suddenly give way beneath the load of coal they support. This sudden tumbling in of the roof of the fire at once deprives it of air, and the flame goes out as a matter of course. A fire ought to be so nicely graduated in its component parts that the paper should be just sufficient to ignite thoroughly all the sticks, and the sticks just sufficiently numerous to heat the coal to a heat at which its gas becomes disengaged. When this point is reached, the coal lights itself, and no more trouble is incurred. A fire, however, may be lit from the top as well as from the bottom ; indeed, Dr. Arnott has introduced a grate which enables him to reverse the order of Nature in this respect, for the fuel is supplied from below. There is one great advantage in this method of supplying the coal,—no smoke is produced, a very important matter, when “the faculty,” in the shape of smoke doctors, have given your chimney up as incorrigible. This invention, if it would only allow the fire

to burn brightly, would be invaluable, but unfortunately the life of the fire, the flickering, glowing, changeable pictures we see in it, are lost when it is made to burn downward, and it puts on the appearance of those sham fires on the stage, or of those gas-fires (otherwise so excellent) which glow with such a motionless heat, and which we dare not poke. The principle of action of these fires (smoke-consuming fire-grates) is simply this:—The smoke, or disengaged particles of carbon which arise when heat is applied from above, has to pass through the fire, in the course of which it is burned. If we could accomplish this process without deadening the cheerful hearth, it would prove to be one of the greatest inventions of the age; for it is the smoke which hangs over our heads that renders the air of great cities so impure and unhealthy, and which destroys at once our architecture, our verdure, and our household goods. If we could be content with mere heat by our fireside the end is no doubt attained; but the Englishman looks for a soul in his fire as well as a body, and no amount of mere caloric, however steady, would reconcile him to an Arnott stove, in which he can see no pictures in the fire, and which he cannot manipulate according to his wish, or give his friend permission to do so, however long he may have known him. For the same reasons stoves are inadmissible among us, however well suited they may be for the long and severe winters of continental kingdoms. When we have to fight months for dear life with King Frost, the matter is too desperate to allow of the æsthetic

element to appear in it. But in our comparatively mild seasons we can afford to suit our liking in the method of maintaining our caloric, and we think there is little doubt that to the end of the chapter the veritable Englishman will be found, with coat-tails parted, warming himself before the open fire-place.

THE DEAD-MEAT MARKET.

WHEN we consider that the rise in the price of meat which has been taking place gradually these last thirty years, but with great rapidity these last ten years, affects the poor in a far greater degree than any other class of the community, it is not out of place in a work of this character to make a few inquiries into the subject. If coals were to go up forty per cent. in price, our manufacturers would make an amazing outcry, and possibly, through their powers of combination, would speedily provide some remedy for the evil. But the poor and the labouring class do not possess the same powerful means of combination, and they suffer in consequence. The working classes, in one sense, are, however, machines, and it is as necessary for them to keep up their steam as it is for the engine of the manufacturer: their coal, in other words, is meat, and meat they must have if they are to maintain their powers of work; but out of their present wage this they cannot do.

It is possible that when the cattle plague has wholly passed away, butchers' prices will somewhat decline, but we are told, on the very best authority, that our chief

articles of muscle-making fuel will never return to old prices, and that these prices can only be kept within any due limit by importations from abroad. If we ask any butcher the causes of the rapid rise in the price of meat, he immediately tells you that it is owing to the cattle disease. But we know, on official authority, that only five per cent. of cattle have succumbed to this plague. This loss has been again far more than replaced by importation from abroad. Indeed, "the Roast Beef of Old England" is rapidly becoming a thing of the past. Our best butchers buy foreign meat equally with home-grown. Our imports are mainly drawn from the Dutch and German ports; these, again, draw their supplies from the depths of the Continent. Styria and Bohemia and Hungary are now our grazing grounds. France sends us some noble beasts, and Spain and Portugal furnish much finer cattle than our own as regards size, and we are told on all hands that they are rapidly increasing in quality now that the trade is a growing one, and the tastes of the English consumer are consulted. But it seems pretty clear that it is not so much the Rinderpest that is answerable for high prices as Government Orders in Council, which have paralysed the whole trade. The stoppage of circulation in the cattle trade has thrown immense impediments in the way of the butcher; he has lost his time, an item which makes no show, and the graziers have lost their means of obtaining foreign stock for fattening, which has had the effect of reducing our own flocks and herds in a remarkable degree; so

much so, in fact, that meat is cheaper in the metropolis than in any other of our great towns, and the country for a hundred miles round London is supplied from its markets. These facts, together with the still more important one, that whilst our population is growing at a great rate, we are becoming greater meat-eaters, will, we think, sufficiently account for the present spasmodic rise in price, and the gradual and seemingly less accountable increase going on during the present generation. As far as we can gather from the very interesting Government Report, "On the Trade in Animals," our main hope of keeping down the price of meat depends upon the development of our foreign imports, and upon improved means of bringing home-grown meat to market. We should say, judging from the evidence given by butchers in this important inquiry, that the vendors of meat are themselves a very prejudiced class of men, by no means up to the work of the day, and incapable of getting out of old ruts, or of accommodating themselves to an altered state of things. No doubt a new race, with larger ideas than those of their fathers, will arise, who will perceive that we must in future draw our meat mainly from abroad as we do our wheat, and that the machinery that was fully adequate when the meat travelled from Smithfield to their private slaughter-houses breaks down under a system which will send them for supplies to the end of the earth.

Mr. Rudkin, the Chairman of the Markets Committee of the City of London, tells us that "during the

next three or four years London will be practically supplied with foreign cattle," and the evidence proves that the metropolitan city during eight months in the year is very largely supplied with dead meat. Dr. Letheby tells us that five years ago about 80,000 tons of meat came to the metropolitan markets annually, but that it is now 150,000 tons. Our primest beef and mutton come from Aberdeen. Scotch mutton, indeed, comes with intermissions of a week or so of the hottest weather, all the year round, in perfect condition. We are even told that although the meat does not look quite so well to the eye, it eats better, and will keep one day longer than town-killed meat. It is clear, therefore, that in the future we require to smooth the way for an entirely new method of supplying our markets—to create a machinery for the conveyance and reception of a widely-extended field of supply; and it is to the perfection of that system we must look for keeping meat within the reach of the poor and of working men. At present, no doubt, prices are enhanced by the great friction, if we may so term it, which takes place between the time the beast leaves the field and its entering the butcher's shop in the shape of joints. Not only do our butchers require to adopt quicker methods, but our railways must mend their ways. As it is, with one exception, they have done nothing towards expediting matters as regards the carrying of meat. And this, be it remembered, is a matter of vital importance, inasmuch as a question of a few hours in transit in summer is sufficient to transform wholesome

meat into a mass of corruption. The one exception, which deserves to be widely made known, is the Bristol and Exeter Railway. Necessity, they say, is the mother of invention, and to the Order in Council prohibiting the carrying of cattle by railroads we owe some very astounding results. Finding their traffic annihilated in live stock, the directors at once turned their attention to carrying dead meat. They ran special fast trains to the West of England, which is full of rich grazing districts, and fitted up trucks just like shambles. These they ran by a siding into their goods-shed, where a regular meat market was fitted up. This being done, they made known to the farmers on their line of railway, that "the West-of-England Produce Company offer at their stores ample and complete accommodation for the reception of carcasses sent to them by railway, and that with a view to diminish, as far as possible, the inconvenience and loss that must necessarily arise under the present restrictions, both to the graziers and to the public, they have made the necessary arrangements for the sale of carcasses, which must be addressed to the care of Mr. H. T. Swan, West-of-England Agricultural Stores, New Cut, Bristol. . . . As manager, they authorise me to say, that until some other arrangements were made, we should be responsible for the proper account of sales, and for remittances. We found that this was responded to, to a very great extent, by the graziers and farmers of Devonshire and Somersetshire, and that several station slaughter-houses had been erected, so that animals were slaughtered at

the railway stations, put into very commodious vans, hung, in fact, as they would be in shambles, brought to these stores, and then they were offered for sale." As may be supposed, the butchers were immediately in arms; although a carcass market was brought to their doors, they refused to have anything to do with it; they even came to a resolution not to deal with any one who sent these carcasses to market. But the company were not to be defeated; they advertised the meat, and the public at once responded. "They rushed down in very large numbers, and there was no difficulty at all in selling the meat. People of first-class respectability in Clifton, such as physicians, proprietors of schools, and others, clubbed together; several gentlemen said, 'We will have a sheep between us,' and all that sort of thing. There was a very great demand, and farmers and graziers, if one may judge from the success which attended the undertaking, got very much better returns through this company than they were receiving from the butchers, while, on the other hand, a very large saving was made to the purchaser." Here was a tremendous revolution. This meat sold for 4*s.* 8*d.* per stone, or 7*d.* a pound, at the same time that meat was selling for 10*d.* per pound in Clifton; and we are further told that the effect of this movement was to reduce the price of meat 2*d.* per pound at the butchers'. Thus, at one stroke, the grazier and the farmer were brought into connection with the consumer—an abolition of friction with a vengeance; the carcass butcher, the salesman,

and the retailer were swept off the scene at a blow ; and the result was a reduction of the price of meat by the amount of 3d. per pound. This is a fact worthy of all consideration, for whilst it is quite possible for the public to live without butchers, they certainly cannot live without meat. We hear that this method of distribution is still going on at Bristol ; that the co-operative stores in that city buy entirely from the railway company, and redistribute to their shareholders. The co-operative system is a very large one, and will, we believe, ultimately bear important fruits. We do not wish to enter into the subject here, but the example we have given of what is being done at Bristol may certainly be followed in other large cities contiguous to great grazing districts, provided railway managers act with the same spirit as the manager of the Bristol and Exeter line. It has been objected that slaughtered animals get bruised in transit, but we see, by the institution of these "travelling larders," that the meat comes up in very perfect condition, each carcass being so secured laterally that it cannot get bruised by bumping up against the next carcass. The consequence of the perfection of these carriage arrangements is, that this line continues to carry large quantities of dead meat, now that the prohibition against carrying cattle has been rescinded. The carriage of live beasts has been a disgrace to the country. Cattle often are detained on the road between five-and-twenty and six-and-thirty hours, without one drop of water or mouthful of hay ; the consequence is, that they arrive

at their destination fevered, and often afflicted with the foot-and-mouth disease. Cattle in such a condition will not drink, and if killed when thus fevered are very difficult to keep, and always eat badly; if, on the other hand, they are allowed to rest, the loss of time enhances their cost to the butcher. The treatment of beasts in the cattle-ships is equally bad: the most obvious arrangements to give food and water are neglected, and beasts after a long voyage become so exhausted that they lie down and are trampled upon. Inasmuch as the cost of meat has been so greatly raised by the cattle plague, and the vexatious Orders in Council to which it has given rise, it is of the utmost importance that for the future it shall not again re-enter this country through the introduction of foreign cattle. The whole of England was poisoned, we are told, through the Metropolitan Cattle Market, at which beasts were sold that had been brought up the Thames. In order to shut this door, it has been proposed that a foreign cattle market shall be established somewhere down the river, near the place of landing from the steamers; that here the cattle should be sold and slaughtered, and only allowed to enter the metropolis as dead meat. If this could be done, the metropolis would at once get rid of many obnoxious trades which cluster around the slaughter-houses—the fat-boiling, bone-boiling, blood manure-making, catgut-making, the hide and bone stores, &c., which now render the neighbourhood of Whitechapel so unhealthy and unsavoury. It would also prevent any further fear on

the head of the cattle plague. The butchers, however, "do not see it." They say that it will not do to separate the foreign and the home market, and that we must have but one market for three millions of people. It seems to be agreed, however, that it would be well to land foreign beasts much lower down the river than we do at present. It is the last twenty or thirty miles coming up the river, where there is a want of circulation of air, that distresses the cattle. This would be avoided by their being landed lower down the Thames, and carried to the Islington Cattle Market direct. We suppose it is necessary to have a live-meat market in the metropolis, inasmuch as in hot weather it affords a kind of reserve for the butcher to fall back upon, in case there should be any diminution in the dead-meat supply; but even in these emergencies the butchers forget that we have telegraphs and railways at our disposal, and beasts may be slaughtered down in the country at half an hour's notice, and sent up by the midnight train. We feel convinced that in another twenty years it will be as rare a sight to see an ox driven through the City as it is now to see a camel. But these results will require a little time to reconcile the trade to them.

We have shown that the dead meat is becoming the great source of metropolitan supply. More than half of the meat sold is killed in the country. It comes regularly from Aberdeen, a distance of six hundred miles—it comes also from Cornwall. If it can be brought fresh across the length and the breadth of the land, we see

no reason why, with proper railway arrangements, it should not come to the metropolitan market from every part of the country. As far as we can see, there is only one objection to the supply of London wholly by country-killed meat, and that is, it would deprive the poor of their chief food, the offal. The liver and lights, the heart, the tripes, and the feet form the principal flesh food of the working classes. If these "oddments" were left behind—and they would scarcely bear carriage—one indispensable item of food would be cut off from the working population. The West End never touches these things; hence the dead-meat trade is gradually absorbing the whole market in that quarter.

Dead meat is beginning to come from abroad too. Holland sends us legs and shoulders of mutton. The distance is not great, and in the cold weather meat travels very well by sea. A large portion of Scotch beef and mutton also comes by the same mode. In a few years we shall certainly be supplied largely from France and Denmark. In most markets the arrangements for the sale of dead meat are so horrible that only Englishmen would put up with them. Old Newgate Market was so thronged in the morning that its narrow entrances were impassable for hours. A vast improvement is, however, observable in the fine market now lately opened on the site of Old Smithfield. Here we find a complete system of railways in the basement of the market, and the market above. The meat is lifted from the vans by hoists to the shambles overhead. This market is placed in direct com-

munication with the slaughter-houses of Islington Market by means of the Metropolitan Railway, and sooner or later the Great Western, Great Northern, and North-Western will run into it. By the use of the telegraph and special meat-trains running at high speeds, it will be able to command all the country slaughter-houses, and by a touch of electric fire our commissariat will be replenished almost as quickly as it could be by the slaughtermen of the metropolis. When one thinks of the amazing increase of stock that is consumed in London, the wonder is how we have been able to get on as we have done with our miserable market arrangements. Our foreign importations, it must be remembered, have only begun within these last twenty years, and during that time our farms have doubled the number of flocks and herds they used to support. A very large per-centage of this new supply finds its way to the miserable holes and corners in the metropolis we were pleased to call markets before the opening of the new emporium at Islington. Even now many of our dead-meat markets would be a disgrace to any fifth-rate town, to say nothing of the largest capital of the world.

It is just possible that we may be able to draw upon still further fields for our meat supplies than even the wide one of continental Europe. We have all heard of jerked beef, or the *charqué* of South America. This is the first of the preserved provisions that has made any noise, or has, indeed, been freely used by Englishmen as an article of diet. We have long known

that the flocks and herds of South America count by millions. Even in those countries bordering the river Plate we are told that there are 22,000,000 cattle and 35,000,000 sheep that are valuable there merely for their skins, horns, and fleeces. The meat which we pine for is a mere drug in that country. Legs of mutton are selling for a shilling each in the large towns, and beef is comparatively cheaper. If we could only preserve this meat so as to be able to carry it across the sea to England, what a boon it would be to our starving millions! Many energetic men have tried to solve this problem by different processes. The best known of these is by cutting the flesh into slips, which are salted and then dried in the sun. The beef thus prepared certainly has this advantage, that one pound of it contains less than half as much water as we find in English fresh meat, and it contains double the amount of nitrogenous matter, which is very important, as it can be sold for 3*d.* per pound; its cost being really only 1½*d.* The nutriment found in this article of food is very great, but then it is not palatable. Health and strength could be sustained by it, but even the poor would soon tire of eating it. The moist *charqué* contains more water, but still far less than our fresh beef, but would never be used as a staple article of food. The salting process takes away many of the more nourishing qualities of the meat, at least when used externally in the old method. We hear, however, that Mr. Williams, long resident in South America, has patented a new process by which the

meat is preserved in a much more scientific method. Whilst the beast is yet warm its chest is opened, the great artery leading from the heart is exposed, and brine is forced into it by great pressure. In ten minutes all the blood is driven before it, and the whole ox salted so thoroughly that every capillary or fine vessel is filled with the preserving fluid, so that by merely cutting the ear or hoof the brine flows out quite pure. This beef is preferable on every account to that salted by the old method, but still it is salt meat, and will not therefore become a staple article of food, although we hear that the samples sent over have sold freely in Liverpool, the price being about 4*d.* per pound. But fresh beef is the thing desired, and we have certainly tasted South American and Australian beef in the joint which was brought over here as fresh in appearance as though it had just come from Newgate Market. The method of preserving it in this condition is as old as the hills, but this particular process has been patented by Messrs. Sloper and Paris, two gentlemen connected with the house of Messrs. M'Call. The process is as follows:—The fresh meat is cut into joints of a suitable size, and placed in tin canisters having a hole at the top and a hole at the bottom; water is then forced in at the bottom until it entirely fills the canister, driving the air or oxygen, the destructive agent, before it; when all the air is expelled the water is withdrawn, and is followed by a gas the nature of which is not known, which fills the tin, on the completion of which process the canister is her-

metically sealed. The action of the gas is like that of a police-constable—it has no oxydising qualities itself, but the moment oxygen leaks in from any imperfections in the tin, the gas instantly seizes hold of it, and renders it powerless to taint the meat. The gas is in all probability the sulphite of potash, which has such a very great affinity for oxygen, that it instantly combines with it and forms the sulphate of potash, which keeps the beef sweet. The dinner given in the City a short time since by the patentees of this process was served with dishes made from this fresh beef, and it certainly was excellent. Measures are being taken to bring this food over in large quantities, and we trust it will be a very valuable supplement to our European sources of supply. It can be sold at 5*d.* per pound, a very great recommendation in these hard times. If this process turns out to be practicable on a commercial scale, we can scarcely estimate its value. It will give us the power to feed the scarcity of one region with the superfluities of another. Beef and mutton are good things, but there are scores of other articles of food obtainable in foreign countries which will then be easily transferred to this.

Baron Liebig has taken advantage of the cheapness of South American beef to establish a factory for his preparation known as “*Extractum Carnis*,” at Fray Bentos, near the establishment of Mr. Morgan in the vicinity of the town of Paysandú, in the Republic of Uruguay. Mr. Ford, her Majesty’s consul at Buenos Ayres, who has made a Report to Lord Clarendon

respecting the different means of preserving the South American beef, from which we have already quoted, says with respect to the Baron's method, "This process differs essentially from that employed by Mr. Morgan, for the meat, instead of being preserved whole, is reduced to an essence, and can, consequently, only be used as a thick soup or stock. Eight small tins will hold the concentrated elementary matter of an entire ox, at a price of 96s., and will make over 1,000 basins of soup, good strong soup; one tea-spoonful to a large cup of water, and either alone or with an addition of a little bread, potato, and salt, affords a good sound repast." This sounds very well, a very *multum in parvo*; but Mr. Vosper, an analytic chemist, in a communication to the *Lancet*, declares that, so far from being an essence of meat, it is deficient in gelatine and fat, and that the fibrine and albumen are insoluble in water, therefore boiling it in that element to produce an essence will not give those elements. If this is the case, we fear "one pound of the essence, which is sufficient to make broth for 128 men," according to Mr. Ford, will do these 128 men little good, as they will get only five grains each of a material from which many of the blood-making qualities are withdrawn. Dr. Hassall has, however, patented a process which he calls the "Flour of Meat," which possesses all the elements of the meat, even to the fibrine itself, which is ground down to an impalpable powder. The value of this preparation to invalids is great, because a cup of highly nutritious beef-tea can be made from it in a

moment. This preparation, however valuable to the invalid, can scarcely come under the title of food for the million, inasmuch as the price is above their reach ; but if the doctor could prepare it like the Baron in South America, where beef is worth scarcely anything, another most valuable and nourishing aliment could be furnished to the public at a very cheap rate. The more preparations we have, giving us the real essence of meat, the better ; it is with pleasure, therefore, that we hear a firm is busy in Australia transferring to us the superfluous flesh of that country. An Englishman may say, with Macbeth, "I have stomach for them all."

LONDON STREET TRAFFIC.

If an aëronaut were suspended in a balloon over London for a day, so as to command a fair bird's-eye view of its great lines of thoroughfare, he would witness a scene, as the hours rolled by, such as no other capital in the world could show him, and such, we venture to say, as no other people but the British would submit to. If he were to "take stock" of the great lines of intercommunication, one thing would at once strike him as very remarkable—namely, that the further they run from the great centres of attraction and traffic the wider they become. The gathering channels, if we may so speak, which traverse the suburbs, where they shade off into the country, are generally of more than ordinary width; whilst the thoroughfares which deliver the vehicular and pedestrian traffic grow fine by degrees and beautifully less the nearer they approach the two great centres, or ventricles, West End and City, to which the great mass of the metropolitan population are propelled every morning. This is the exact reverse of the method in which the blood, which we take to represent the flood of human life, is made to circulate in

the human body. We do not find wide arteries at the extremities, but fine capillaries, the blood-vessels increasing in capacity, until they finally discharge themselves into the great arterial centre.

The reason of this apparently unreasonable and perverse tendency on the part of our great channels of circulation is obvious enough on a little thought—it is regulated by the value of land. In the suburban lines of road a very singular process of enlargement has been going on, which the reader must have noticed himself. Rows of small houses with garden-plots in front have gradually been absorbed by trade—the fore-courts, or gardens, have necessarily been thrown into the street, either in the form of roadway or foot-path. In this manner all the main outlets into the country are gradually becoming colossal in their proportions. Let us instance Brompton Row, Knightsbridge, as having but lately undergone this process of augmentation; the Whitechapel Road and Mile End Road, again, have increased their volume in like manner; whilst from the same cause (*i.e.*, increased commercial value acting through long periods of time), the streets of the City have been encroached upon until they are no longer able to carry the human tide that is daily being forced through them. This law, dictated by commercial instinct, we have never seen noticed, but it is worth consideration whilst contemplating the congested condition of the leading thoroughfares, but especially those of the City. If, for the sake of our bird's-eye view, we again suspend ourselves in the

balloon, the dead-lock the traffic is brought to, by reason of the perverse system of street-making prevalent among us, becomes painfully apparent. Towards nine o'clock the immense army of business men begins to move upon the City. Let us watch those wings which approach from the south-west, west, and north-west; and when we speak of an army we are by no means using a figure of speech, for the City proper is invaded every day by a torrent of men larger than Napoleon ever had under his command. The main collecting channels into which this moving mass of humanity is forced are two. The line of Oxford Street, Holborn, and Newgate Street forms one of these, and Piccadilly, Strand (augmented by the torrent flowing into it at Charing Cross from Westminster Bridge), Fleet Street, and Cheapside form the other. Either channel is scarcely sufficient to deliver its load of vehicular and pedestrian traffic, but we find them both commingled at the top of Cheapside; and at an early hour in the day a congested state of the circulation takes place, as a matter of course, in its narrowest point, the Poultry, which in no part is more than thirty feet wide in the roadway. Practically, then, the Poultry is the western entrance to the heart of the City—all the lines running from west to east being collected into one, and then stopped in the narrow neck of the bottle! It certainly is no exaggeration to say that, many times in the day, a sheep-dog could leap from carriage to carriage for the whole length of the street—from St. Paul's Churchyard to the Mansion

House—as easily as he could scramble over the backs of a flock of sheep.

And this stagnation of the circulation of commercial men takes place at a time when their minutes are worth guineas. What a curious speculation it would be to calculate the fortunes that have been lost by the precious moments wasted through the block in Cheapside! It is observable that in none of the great north and south channels of communication is there any stoppage of the traffic (with one notable exception), unless where they come in contact with, and are interrupted by, the current running from east to west. Moorgate Street is never stopped, Tottenham Court Road runs freely, and so does Bishopsgate Street until it crosses Cornhill and Leadenhall Street. The same may be said of its continuation, Gracechurch Street, were it not for the arterial current passing and repassing from Lombard Street to Fenchurch Street, which renders the whole roadway through the greater part of business hours a scene of curses and collisions. At this point Gracechurch Street is the pipe of a funnel leading to and from London Bridge—the narrow strait dividing all England eastward of that point. The population located upon its banks is little if anything short of one million, and it is constantly growing; hence it must be seen how vain it is to hope that by any system of police regulations a free passage across this *Via Mala* can be maintained. It may be urged that the opening of new railways, and of other bridges, and new streets (on the other side of the river), will do much to turn the

flank of this narrow pass gorged with traffic, horse and foot. But we have proof that all the easements which have lately been made with respect to this bridge do not by any means even keep the traffic upon it from increasing. In the year 1850, in a single day, between the hours of eight and eight o'clock, 13,000 vehicles passed over it; in 1860 this number had increased to 16,000, or 23 per cent. In the latter year the Brighton line opened a western terminus at Pimlico, and in 1864 Southwark Bridge was opened toll free. From an average of 1,000 vehicles a day, the traffic across it rose to 3,700 by 1865, a very large portion of which must have been abstracted from London Bridge. In 1864 the South Eastern drained a further traffic, in cabs, &c., from this bridge, by reason of the extension of its terminus to Charing Cross; and in the same year a new road was opened on the south bank of the Thames, which gave a passage for 5,700 vehicles daily from the west over Blackfriars Bridge, very many of which would have otherwise gone over the great City bridge. Nevertheless, such was the amount of traffic attracted by this structure, that notwithstanding these various diversions, in the year 1865 its vehicular traffic had increased to 19,000. In the face of such facts as these, we cannot wonder that the opening of Cannon Street station, or of the London, Chatham, and Dover station at Ludgate Hill, has had no effect in keeping down the number of carriages of all kinds passing over it.

Mr. William Hayward, the surveyor to the City

Commissioners of Sewers, who, by means of the police, has collected many important statistics with reference to metropolitan traffic, upon which he has founded a very able Report, urges that the only remedy for this overpowering rush across London Bridge is to build a new one lower down the stream. This proposition would necessitate the closure of the navigation for ships and ocean-going steamers to the west of it, a matter which would entail enormous losses upon the wharfingers who at this point of the river have colossal interests. Now that the Thames Tunnel is closed to passage traffic, having been purchased for the purpose of running a rail beneath the river, it has been determined to make a new subfluvial tunnel a little higher up, connecting Tower Hill with Bermondsey. The rail will no doubt carry a much larger number than the dismal and damp old Thames Tunnel, which was too far down the river to carry much of the metropolitan traffic. We may here notice, by the way, that the public do not even know of the new tunnel which progresses so silently as to be unobserved. Very different from the excitement created by the construction of the first tunnel, which was thought to be one of the wonders of the world—a proof this of the vast advancement made in the science of engineering during these last forty years. These changes will relieve the great City bridge of a large amount of omnibus and cab traffic, very much larger than any of the railways open across the river now carry.

We are reminded that what may be termed the

noisy highway, in contradistinction to the "silent highway" above bridges, could be made much more subservient to passenger traffic, if the river steamers were not so repulsive and dirty in appearance. Some years ago we were promised some new and spacious boats like Roman galleys, but they never made their appearance. There are, we see, some new steamers, with fine deck cabins and promenades overhead, capable of carrying great numbers of passengers without inconvenience. If there were many such, as the approaches to the piers are now made more convenient and public, we have no doubt whatever that they would be used by large numbers now travelling by omnibus. Possibly when the Thames Embankment is finished—which of itself will only cause a greater embarrassment to London Bridge, and possibly to the Poultry, in consequence of the increased current it will throw across the latter thoroughfare at its Mansion House Street *embouchure*—we shall have such improved river steamers, both above and below bridge. We may hope, at least, that by these means London Bridge traffic may be kept stationary for many years; and who knows what engineering science may enable us to do by that time?

But independently of the water communication at present existing between the different parts of the City and the West End, causing chronic congestion of the traffic, there is the spasmodic rush in and out of the City morning and evening. It is unnecessary to say that the small space of 631 acres under the City jurisdiction is the most valuable area of ground in the

world. When we know that the Commissioners of Sewers lately had to give £10,000 for a plot of ground, at the corner of St. Paul's, measuring 412 superficial feet, we see the reason why the City proper is rising up skyward. Just as by the action of natural laws lateral pressure will sometimes squeeze level ground into considerable elevations, so the financial pressure is now slowly working, by a law quite as irresistible, to double the height of the houses of business and great warehouses in the City of London. Whilst, however, accommodation is thus afforded for a very large augmentation of business men during the day, the resident City population is growing year by year smaller. In 1851 there were 129,128 residents; ten years later this number had declined to 113,387, a smaller number than it had ever contained possibly since the days of the Plantagenets. The City proper is, in fact, nothing more than a vast counting-house, deserted at night, with the exception of a few housekeepers and the poor, who are to be found everywhere. Between seven and ten in the morning the true stream of commercial City life sets in. In 1860 the police counted the number of persons who arrived on foot and in vehicles, when the number was 706,621; and, according to the increase of population since that time, Mr. Hayward estimates that at the present time the number who seek this commercial centre of the world daily is at least three-quarters of a million, and the same number of course leave it. As it is well known that the arrivals and departures are mainly between the hours

of nine and ten o'clock in the morning and five and six o'clock in the evening, we may imagine the stress put upon the great City thoroughfares to carry this multitude of people. The Duke of Wellington used to say that there was but one man in England besides himself who could march 10,000 men out of Hyde Park: is it to be wondered at, therefore, that 750,000 find a difficulty in engineering themselves through the narrow streets that lead to and from the City? It may be said that, as the larger proportion of the daily City visitors are carried by their own legs, the difficulty is not so great as may be imagined if they all went in on wheels. The police tell us that the mean of the whole number entering the City in 1860 was 1 vehicle to 3.13 on foot. But averages are deceptive. What our road-makers have to provide for in vast populations are spasmodic rushes. A steady downfall of rain at once doubles the number of riders, and halves the means of riding, as omnibuses and cabs find no outside passengers under such circumstances. Our vehicular means of conveyance are not elastic enough, as every one knows, on such occasions. But happily engineers have found out the way to relieve the peripheral and centrifugal rush on the part of trading London. The underground railway system, which is purely a passenger system, is expansive enough to relieve any pressure upon the streets; and the construction of these conveniences under all the great lines of thoroughfare leading to and from centre and suburbs may be looked upon as only a foregone

conclusion. Already the Metropolitan line provides an arc of communication for the northern half of the metropolis, whilst the Metropolitan Extension will in a short time complete the southern sweep. In any continental city such a line would not be of so much importance as in London, where we have no Boulevards. With us it opens up a perfectly new route. We are struck with astonishment sometimes at the very short stages the majority of the travellers by this line go. It would seem to be scarcely worth while to mount so many steps to travel so short a way. But the way is only short by rail: by road, even where one exists, the way is often so roundabout that a journey by it, which occupies by the line only a few minutes, takes on foot perhaps half an hour. The circular line is therefore of immense advantage to the metropolis irrespectively of the through riders. But it is clear that a line running under Oxford Street and Holborn to Smithfield is even more required than this useful roundabout rail. The Mid-London line was projected to meet this great want, and it seems extraordinary to us that the Committee of the House of Commons were short-sighted enough to overlook the necessity for such a route, when they authorised the Inner Circle line, and unwisely promised that no other metropolitan scheme should be considered until it was completed. The consequence, as we have seen, is the rejection of the Mid-London scheme, for some time at least.

Nevertheless a new east and west street is absolutely indispensable, a street that shall turn the flank of the

Poultry, and escape the dead-lock at the ends of Cornhill and Lombard Street. Mr. Hayward proposes a route for this purpose which appears to us to be admirable. His idea is to run a street, 70 feet wide, starting from the eastern end of Holborn Valley Viaduct, by St. Sepulchre's Church, and terminating by a junction with Whitechapel High Street, close to Commercial Street. It would run to the north of St. Martin's-le-Grand, cross Wood Street, Basinghall Street, north of Guildhall, Coleman Street, and Moorgate Street, about 250 yards north of the Bank; thence by Drapers' Buildings to London Wall, along the northern side of Wormwood Street, up to Bishopsgate Street Within, across Houndsditch and Petticoat Lane, and thence to Whitechapel Road, near Commercial Street, where, before long, the Great Eastern, the East London (Thames Tunnel line), the North London, and the Metropolitan lines will have a joint terminus. Of necessity such a conjunction of important lines will draw a very large traffic to this point, vehicular and pedestrian, and it is quite certain that the present thoroughfares leading to it will be utterly inadequate to carry it. Such a street is therefore a necessity, and we have no doubt that it will eventually repay itself. Although land in the line of the great City thoroughfares, and even in the line of those at the West End, is so valuable, yet a few paces out of this line its value sinks greatly. A bird's-eye view of the metropolis,—even a run along some of the lines that are on a high level,—shows that immediately con-

tiguous to the most flourishing thoroughfares there are hollow squares or blocks of building of a character so squalid as to astonish the spectator. These blocks are sometimes surrounded by streets in which the shops are very valuable, and the inhabitants are prosperous and respectable. Our streets are, in fact, hollow squares, in which we hide our wretchedness and poverty—the very reverse of the infantry square, in which all the valuables, both human and otherwise, are placed for security against attack. Such property cannot be very valuable; a street driven through it would convert these retreats of filth and fever into a highway that would every year increase in value. We do not know what the ultimate loss, if any, will be by the construction of New Oxford Street; it cannot in the long run be much; but we do know the value it has been to the neighbourhood in ventilating and purifying it. Side streets that were pestiferous before it was made are now putting on a fresh appearance; even the people are clad more decently now they are open to the light of the outer world. Such would be the sanitary as well as the commercial value of opening up a new street sure of a large traffic in an entirely decayed neighbourhood. The navvy, when he slashes through the festering and putrefying hovels—for they can scarcely be called houses—in such back slums, will act as curatively as the surgeon when he passes his knife through a corrupt wound.

We have spoken hitherto of the great commercial centre of traffic, which is, indeed, the one that is most

distressed ; but the seat of the Legislature and of the Court, the quarters of the nobility and gentry, and, in fact, the pleasure city of Westminster, also deserve some attention with respect to this question of traffic. There can be no doubt that the pressure upon Cheapside is greatly augmented by the conflict of vehicular traffic between these two centres. The traffic of the West End proper, however, is of a totally different character from that in the City, depending as it does mainly upon season and the capricious movements of fashion. The streets that are comparatively deserted in the autumn and winter months, in April, May, and June are, on particular occasions, nearly as crowded as the City thoroughfares. Piccadilly, looking down the "dip," appears more like an avenue of flowers—the open carriages displaying the brilliant toilets of the fashionable fair—than an ordinary street. Regent Street, again, is often blocked in the afternoon, but as a rule the thoroughfares are equal to the traffic, greatly exceeding as they do in capacity the City streets. Thus, Regent Street is 52 feet wide, Westminster Bridge, 56 feet ; Oxford Street east of Duke Street, 51 feet ; Piccadilly, west of Half-Moon Street, 50 feet 8 inches ; whilst the most densely-thronged City streets have the following measurements between the footways :—Temple Bar, 25 feet ; Bishopsgate Street Without, 22 feet ; London Bridge, 35 feet. Thus the mean of the four West-End streets is $52\frac{1}{2}$ feet wide, whilst that of the three City thoroughfares is but little more than 30 feet, though they have a strain

upon them in many cases double that upon the West-End ones.

There are no statistics of the vehicular West-End traffic at the height of the season ; we have not, therefore, the means of making a comparison between it and that of the City streets ; but in July, which may be considered the " cheap trippers " season, within the twelve hours 11,343 carriages passed along Regent Street, 8,220 along Piccadilly west of Half-Moon Street, and 10,619 along Oxford Street south of Wells Street ; and 11,609, the largest vehicular traffic west, passed over Westminster Bridge. This is diminutive indeed to the number composing the crush of wheels passing along the constricted City thoroughfares—Fleet Street, by Temple Bar, with its 25,000 ; London Bridge, with its 19,000 ; Holborn, with its 29,000 ; and Blackfriars, with its 24,000. Whilst, however, there is yet room enough for the fashionable in the majority of the West-End streets, there is one thoroughfare that is constantly choked by reason of the same cause as blocks London Bridge. It is true there is no river separating vast masses of the population, such as is the case eastward of London Bridge ; but there are Hyde Park and Kensington Gardens, which for one mile and a half as effectually stop the passage of heavy, and a great deal of the light, traffic north and south. Hence the whole of the traffic eastward is forced into the narrow gut of Park Lane, whilst the nearest western road is Silver Street, Bayswater, a tortuous thoroughfare of a most inconvenient kind.

But, independently of the loss of time caused by the chaotic condition of the metropolitan traffic, we must consider the very large loss of life it entails. There are many battles that are famous in history, in which the killed and wounded have been less than Londoners annually suffer in the battles of the streets. According to a Parliamentary return just issued of the number of persons run over in the City and metropolitan districts, we find that from the 1st of January, 1865, to the end of February, 1866, there were 180 persons killed, and 2,175 maimed and injured. And this list is very far from being perfect, as it only includes those cases which come under the knowledge of the police. Dr. Lankester, in his third annual Report as coroner for the central district of Middlesex, states that he believes the number of maimed must be greatly more, as he finds that last year, in the Royal Free Hospital alone, 1,458 out-patients were treated there for accidents so received, and that 31 cases resulted in death. If such a multitude of injured persons were received into a second-rate hospital, what must be the total received into all the great metropolitan hospitals! It is certainly extraordinary, however, that the City, which is by far the most crowded with pedestrian and vehicular traffic, and which *à fortiori* we should have credited with the largest number of accidents, is by no means remarkable in this respect. For instance, within the civic limits for the time mentioned, there were only 17 persons run over and killed out of a daily circulation of three-quarters of a million of people, whilst in the

comparatively open district of Hampstead there were 14 deaths from the same cause. There seems to be only one possible explanation of this singular discrepancy. The number of female pedestrians in the City proper is only as 1 to 5 males, and it is generally the former sex who hesitate and are lost amid the rush of vehicles.

Among the metropolitan police divisions in which the greatest number of fatal accidents occur may be reckoned Finsbury, Stepney, Hampstead, and Highgate. But the greatest number maimed were to be found in St. James's: namely, 138; in Lambeth, 140; Camberwell, 101; and Southwark, 142. The crossing just by the entrance to the London Bridge station certainly appears to be the most dangerous in the metropolis; but although many persons are annually injured there, the deaths are not many—only 6, in fact, taking place in the entire district. The only manner in which we can account for the great number of fatal accidents which occur from being run over on suburban roads is by supposing that they are more subject to the furious driving of tradesmen's light carts—that frantic charioteer, the butcher-boy, being the greatest offender. A pedestrian is always within an inch of his life in the morning, either from the furious little pony, which seems to be rendered frantic by the tray bumping upon his back, or from the butcher's cart which gallops round the corners, totally regardless whether it runs over you or not. In the more settled districts they have the fear of the police before them, but in the

suburbs they stay their chariot-wheels for no living thing.

The street crossings which are most liable to produce accidents are not those in which the traffic crosses at right angles, such as at the bottom of Ludgate Hill. The number of vehicles is so great there, and the danger of collision so imminent, that they are obliged to proceed at a walking pace; moreover, at such points the police are ever ready to assist the timid. The really dangerous crossings are those where several roads meet, such as the wide open space at the top of St. Martin's Lane. Here the foot-passenger is subjected to a concentrated fire, which takes him in flank and rear—he is raked by swift cabs as remorselessly as were the "Six Hundred" in the valley of death. There was a very spiteful crossing at the bottom of Snow Hill, down the incline of which a succession of omnibuses are slipping and sliding when the roads are wet and greasy. Small side streets again, leading to great thoroughfares, are very dangerous. Carriages turning rapidly out of narrow thoroughfares are apt to bewilder the crowd of persons crossing at such situations. Argyll Place, Regent Street, enjoys a sad celebrity in this respect; and Hanover Street, turning into Hanover Square from Regent Street, is a regular trap for the unwary; and the same may be said of the Piccadilly end of Park Lane. At many of the frequented City crossings we believe that the greatest convenience and safety from accidents would be afforded by subways. In all railway stations we find they are adopted, and

really between the passing of trains there is less danger there than in the crowded metropolitan thoroughfares. Bridges of the height necessary for the passage of traffic beneath them would be both unsightly and very laborious climbing for the elderly people that would mostly use them.

It is evident that we are slowly taking a leaf out of the Parisian book : we are rebuilding the City—from bricks we are turning it into stone and marble. What a pity it is we cannot make our thoroughfares wide as well as the houses high ! Perhaps our children may see even this accomplished, and then London will certainly be the most splendid city in the world.

PATRIARCHAL ENGINES AT SOUTH KENSINGTON.

IN an obscure corner of the South Kensington Museum a collection of models of patented and other machinery is to be found, packed away for want of space much as goods are packed away at the Pantechmicon or other places for storing furniture. Products of mental efforts—nay, of anguish of mind—unparalleled in any other branch of human labour are found stacked away one upon another as bricks are stacked away in a builder's yard. We refer to those patriarchal engines upon which the greatness of modern England is founded—the tools with which we move the world, plough the water, traverse the earth, and annihilate space and time: the first steam-engine of Watt, the first engine of the first steam-vessel, and the first practical locomotive for goods and passenger traffic. Amid the smaller deer of the inventive mind these great engines, rude and rough, yet containing the germs of the wonderful motive powers which have changed the face of Europe, tower like material giants, and suggest to the mind almost limitless ideas of power. At the further end of the room we recognise in the great rocking

beam, with circular ends hung with chains, the old Newcomen engine, in which Watt made his first grand improvement, and, in fact, inaugurated the modern steam-engine. This was the "fire-engine" of the old pattern, in which Watt introduced, after many trials and failures, the separate condenser and air-pump. One cannot gaze on this formidable-looking engine towering above one's head without feeling that one is in the presence of ideas which separate old from young England—the slow, solid past with the vigorous, rapid England of the present day, which in some sense seems to be changing even the character of her people. At the time Watt introduced his happy idea of withdrawing the steam from the cylinder, and condensing it in a separate receptacle, the working of the old Newcomen engine was becoming quite inadequate to master the water in the Cornish mines. The great expense of coal, wasted as it was in these ineffectual engines, in which the cylinder was cooled every stroke by the injection of the condensing water, was fast rendering the working of the mines impossible; and it was the happy thought that flashed through the mind of this great man, crossing the Glasgow Green—the separate condenser—which alone saved the proprietors of the greater number of them from insolvency. It is just possible that the difficulties with which Dr. Roebuck, the friend and financial ally of the inventor, had to contend, when this improved engine was coming into existence, were the cause of its success. "There would have been no Watt had there been no Boulton" has

been well said ; for, without the resources of the great establishment at Soho, it is doubtful if this engine could ever have been got to work. Its original cylinder was not true in the casting ; the boring engines of those days did not work from a fixed rest, but followed with the hand the inequalities of the metal. It was the happy discovery of Mr. Wilkinson's boring lathes, which bored from a fixed rest with exact truth, which enabled the inventor to make his engine work with accuracy and economy. This engine was employed for many years at Soho in pumping water. At the date of its invention the steam-engine did not produce a circular motion. Its rectilinear action was converted into a rotary one in a secondary manner only. The pumped-up water turned a wheel ; and thus, at second-hand, millwork of all kinds was put in motion. The simple idea of a crank appears never to have been thought of by the earlier improvers of the steam-engine, although it had been in existence from the earliest time. But of this presently. The "Old Bess" engine, as this relic of antiquity was called—for what ages seem to separate us from the time of Newcomen, and what prodigies of labour and what mighty changes have been wrought since its creation, and these, and not mere years, are the true measure of time!—was in its day the grand show of Birmingham. The "fire-engine" formed the attraction of many crowned heads and great personages from all parts of Europe. It turned an organ in the presence of George III., to show its delicacy of touch as well as great power, and

it aided in grinding and polishing the shoe-buckles and buttons of the past generation. It was at work not many years since as an auxiliary engine to the more perfect "sun and planet engine," now in the Museum, at the opposite side of the room; and finally, when it was removed from Soho, it was stowed away under a railway arch at Birmingham, where any person wanting a piece of good old "yron" used to knock off a link of its piston chain. From this slow process of demolition it was rescued by the authorities of the Museum, by whom it was obtained as a gift from Messrs. Branson and Gwyther, the contractors. The patent of this engine was taken out in 1769, but it was then in far from a working condition, and had made no adequate returns to the Soho firm. The terms of the patent were, however, extended in 1775 for twenty-five years, to enable them to reap the benefit of their long years of labour and great expenditure.

Let us now pass from this improved Newcomen engine, which was, in fact, but the steam-engine in a state of transition—an old wedded to a young idea; a giant with one arm tied behind him, for the steam only acted on one side of the piston, the weight of the pump-rods producing the up-stroke, and only having one motion—to the equally antique-looking machine opposite, but one which, in fact, embodies all the principles of a modern engine. The patent for the "sun and planet engine" was taken out in 1782. Watt had long seen the necessity of giving a "rotative" action to his machine. It was while scheming this move-

ment that the great piracy took place, which seems to have annoyed Watt more than anything else in his inventive career, and which caused the application of the particular invention which gave the name to the machine. According to his own account he had made a model with a crank action, but, having neglected to take out a patent immediately, the application of the crank was stolen from him by a workman and communicated to an engineer, who patented it and applied it to a steam rolling-mill, which at the time attracted much attention. Watt bitterly complained of this theft; and the fact that the workman, Cartwright, was afterwards hanged, seems to have afforded some relief to his mind. "Watt, writing to Mr. Boulton in this year, says the real inventor of the crank rotative motion was the man who first contrived the common foot-lathe. . . . The applying it to the engine was merely taking a knife to cut cheese which had been made to cut butter." This was perfectly true, but it applied to Watt's application of the invention as well as to the man who stole the idea of its application from him. The latter must certainly be credited with introducing the fly-wheel into his engine, the value of which Watt himself did not see at first, but afterwards adopted it. Precluded from using the crank, Watt had to scheme some other means of effecting his purpose. He invented five methods of accomplishing this, of which he selected the sun and planet motion as the best, and introduced it for the first time into the engine now in the Museum, the patent for which bears

date 1781. This engine contains various appliances for which patents were taken out at a later date, such as the parallel motion, patented in 1784; the regulator or governor balls, and the method of applying the steam on both sides of the piston, patented in 1782; indeed, it contains the germ of all its modern improvements, with the exception of the crank, the sun and planet motion probably being retained because, by its peculiar action of one cog-wheel on the connecting-rod working into another on the axis of the fly-wheel, two revolutions were obtained for one by the crank action. This engine was known as the "lap-engine," and was employed until 1862 in grinding and polishing steel goods in the original works at Soho, where it had been left, exposed to the weather, in a roofless room, after the breaking up of that establishment. The workmanship is rough, and the whole appearance of the engine, with its rocking-beam, reminds us of times when timber trees were used for that purpose instead of cast iron;—but no Englishman can look upon this machine, with its wonderful contrivances, without veneration, for in it he beholds the first of its kind. Like the mighty infant Hercules, this creation was dandled by numberless handmaids while still battling for existence, but to Watt alone is due the calling forth its vigour and its subtle and delicate action. There are many precious things in the adjoining Museum of Art and Science, but we question if there are any to be compared, where results are taken into consideration, with these two old rusty fabrics of iron rescued from

deserted work-rooms and old dry arches by the authorities of the Patent Office Museum. When a proper apartment has been provided for this department of the Patent Office a very valuable relic of the great inventor is promised by his great-grandson—nothing less than the contents of the little workshop in which he laboured up to within a few weeks of his death. This shop was next to his bed-room at Heathfield, where, since his death in 1819, they have remained as he left them, no one having entered the room or disturbed a thing since his decease until very lately, when Mr. Woodcroft and Mr. Pettit Smith were allowed to explore it. This place, we are told, is a touching memento of the great engineer; the tools are as he left them; the lathe at which he was last at work is covered with chips; the copying or diminishing machine stopped by the hand of death, leaving unfinished little works of art, in which he had been “searching for beautiful forms into the heart of marbles, and bringing them out into full daylight;” his tools mostly of his own invention, and numberless contrivances which the world knows little of. There are yet other relics of Watt in the Museum—the model steam-engine which he employed to turn his lathe: the workmanship is beautiful, and it had all the great improvements. The Commissioners should obtain the very instructive model of the locomotive which Mr. Murdock constructed in 1784 upon the principles set forth by Mr. Watt, intended to run upon the common road. Most of our readers will remember it

in the machinery-room of the International Exhibition of 1851, where, they will recollect, it was placed by way of contrast upon the magnificent marine engine of 700-horse power manufactured by Messrs. James Watt and Co. for the 91-gun screw steam-ship *James Watt*. This model is interesting, inasmuch as it was the first ever made by an Englishman, preceding that by Trevethick in this Museum by many years. Watt, however, always thought the locomotive on the common road was a vain thing, but he clearly foresaw the advent and success of the locomotive engine running upon a rail. In 1813, for instance, before a single public line had been thought of,—in fact, in the year when Headley put the first locomotive upon the Wylam Colliery rails,—writing to a friend, he says, “I have always thought that steam would become the universal lord, and that we should in time scorn post horses. An iron railroad would be a cheaper thing than a road on the common construction.”

The parent engine of steam navigation stands in a glass case in the middle of the room. What a contrast it presents to the model of the engine of the *Great Eastern*, close at hand! This engine was constructed in 1788 for Mr. Patrick Miller, of Dalswinton, and propelled a vessel at the rate of nearly seven miles an hour on the lake at his place. How such a speed could have been got out of such a construction, the cylinders of which are not much bigger than the barrels of a beer-engine, we cannot conceive, especially as the rotary motion was very clumsily and wastefully given

to the paddle-wheels by a chain passing round their axles. As Watt had converted the rectilinear action of the piston-rod into a rotary one seven years before that date, and Judkins had, indeed, appropriated and patented the crank, it is inconceivable that Symington, its engineer, should have adopted such a feeble means of translating motion, unless, in his ignorance, he thought his own patent as good as the others. This, although the first trial to propel a vessel through the water which was ever made, never could have been a success. In the same glass case is Mr. Miller's own model of a double ship, with paddle-wheels between them, which he caused to be worked from the deck by capstans turned by men. If Mr. Miller had pursued his plan of moving boats by steam power, he might, by means of the more advanced ideas on the subject daily coming before the public, have had the honour of introducing the first practical passenger-boat on this system, but he seems to have been content to discard his engineer, and to lay up his engine in his drawing-room as an ornament! Symington, however, really introduced the first practical steamboat, as his vessel, the *Charlotte Dundas*, was propelled by a well-constructed engine, and her first effort was to draw after her two barges, each of 72 tons, and tow them at the rate of three and a quarter miles an hour along the Forth and Clyde Canal. This was certainly a practical test of the value of the steam-vessel, and we scarcely see how Symington can be robbed of the merit of the invention, seeing that Fulton did not commence

running his vessels in America until 1807, and then after having obtained drawings of Symington's engine, which, with some alterations, were worked out by Messrs. Boulton and Watt at their works at Soho.

We do not wish, however, to pursue this vexed question; it is quite clear that Symington, from adverse circumstances, did not follow up his success, and it was left for Mr. Bell to inaugurate in Europe the first steam passage-boat, the *Comet*, which plied between Glasgow, Greenock, and Helensburg for passengers only. The old engine, of a most primitive construction, is in the Museum. It has been burnt out of one place, where it did duty as a stationary engine, and was rescued from a blacksmith's shop in Glasgow by the owner, Mr. Robert Napier, and by him presented to the Commissioners of Patents. The construction of this engine was certainly not so effective as Symington's second engine, patented ten years before, but it was started under happier auspices, and continued in operation long enough to establish the principle of propulsion by steam upon the water, which henceforth became general throughout Europe.

In a small glass case a very unpretending model of a ship, with a screw propeller cut out of wood, carries the history of steam navigation up to its present condition. To Mr. Pettit Smith, the present curator of the Patent-Office Museum, belongs the credit of placing the screw propeller in the dead wood of the ship, the only spot in which it can work effectually, and of asserting the value of the new principle so long and so

loudly as to force it upon the attention of the Admiralty.

The screw of the *Rattler*, which in the water tournament so signally defeated the paddle-steamer *Alecto*, is close at hand. With this simple instrument the inventor may be said, like Gulliver, to have dragged the whole British fleet after him. Were the paddle our only means of propulsion, our naval force would be reduced to a nullity. Hostile gunners would wing a steamer as effectually as a sportsman wings a bird, and all the plating in the world would only render a ship so propelled a mere helpless log upon the water. We wish Mr. Smith had been better treated by the Government. The engineer of the *Napoleon*, 90-gun ship, was rewarded by the French Academy with a prize of 30,000*f.* for the mere successful application of the invention, which they frankly place to the credit of a "*fermier de Middlesex*," alluding to the early occupation of our countryman, Mr. Francis Pettit Smith, who, with the exception of a small pension, goes altogether unrewarded to this day for services which have conferred immense benefits upon the naval and mercantile marine of England.

But to return once more to land. What is this locomotive that we see rigged with iron beams and rods, which liken it almost to a ship? This is the premier locomotive—a machine which heralded changes almost as momentous as the steam-engine itself. Compared with one of the splendid engines of the Great Western or North-Western, "Puffing

Billy," the brain-work of William Headley, the Wylam Colliery viewer, and the handiwork of Jonathan Foster, the engineer or smith (for the two terms were almost synonymous in the year 1813), looks but a poor bungling piece of workmanship out of which it would seem hopeless to expect any good results. Yet this very engine was at work drawing eight waggon-loads of coals day by day from Leamington to the shipping port in the Tyne, eight miles distant, from the day she was set rolling until the moment she was finally taken off work for the purpose of being transferred to this Museum. In this engine the two great features which made the locomotive a success were first applied—the sufficiency for traction of the smooth rail and wheel, and the application of the steam-blast up the chimney.* The sufficiency of the smooth rail and wheel for traction was, indeed, *the* great principle the establishment of which rescued the locomotive from oblivion. The only means by which heavy loads could be drawn by locomotive power before Headley's time was by the use of the toothed wheel and the racked rail, as employed by Blenkinsop and Trevethick, but "the pull" tore up the racked rail, and consequently this system had to be abandoned for horses. It was in the year 1812, when the price of corn and all kinds of horse provender was so dear, that the necessity of

* It is but fair to state that the invention of the steam-blast is claimed by the builder of the *Sanspareil*, and was said to have been first applied to the *Royal George*, built in 1827; but how this can invalidate Mr. Headley's claim for the same appliance to the Wylam engine in 1812 we cannot conceive.

substituting mechanical power for living muscle again thrust itself upon the attention of the Wylam viewer. Unless some saving could be made in the working of the colliery the works must be closed, and himself and family thrown out of bread. Thus stimulated to exertion, he brought out his plan of weighting the engine, and of coupling the wheels so as to prevent any of them slipping. He proved this could be done experimentally by constructing a waggon, weighting it with iron, and then propelling it by the power of several men seated upon it and working winches. The carriage, thus weighted, drew several loaded waggons well enough. In order to prove that it was the weight which caused the wheels to bite, in place of the iron load, he substituted a number of men who, at a given signal, left off working at the winches and jumped to the ground, when the wheels immediately began to slip round. The model of this experimental waggon, with the connected wheels, which thus solved the problem of making the smooth wheel adhere to the smooth rail, or, to use the language of Stephenson, of making "man and wife" of them, is in the Museum beside "Puffing Billy," and fully establishes the claim of William Headley to the discovery of this all-important principle. It does seem extraordinary that engineers should have taken it for granted that the wheels must necessarily slip up to the time of this experiment, and that before Headley's time no experiments should have been made. Surely the weighting an engine to produce sufficient friction for the purpose was a very

simple idea that ought to have occurred to our engineers. We suspect, however, that even so late as the year 1813 the knowledge of our practical engineers was limited to rule-of-thumb work. The Wylam engine is certainly an extraordinary-looking machine, as rude and rough in appearance as could well be conceived, and placed as it is beside the Rocket, the premier engine on the Liverpool and Manchester Railway, it looks like a collier beside a gentleman. But it must be remembered that between the dates of construction of these two engines fourteen years elapsed, a period during which the locomotive had grown from childhood to manhood, if we may use such terms to inanimate objects. The Rocket, which, in the most momentous race the world has ever seen, wrested the £800 prize from the Sanspareil and the Novelty, was the produce of the locomotive factory which Stephenson, with the aid of Mr. Pease, had established four years before at Newcastle-upon-Tyne. Mr. Stephenson, when he introduced the locomotive to public notice on the opening of the Stockton and Darlington Railway a few years before, saw clearly enough that it was not sufficient to establish sound principles of working, if the means of carrying them out were deficient. Good engineering principles, like good laws, require good machinery to give them effect, and colliery millwrights and smiths were clearly not up to the work of making locomotives the good working of which depended upon the accuracy with which their parts were fitted. The setting up of the locomotive factory did more, perhaps,

towards establishing Stephenson's fame than anything else. If it could be said that without Boulton there would have been no Watt, with still greater truth might it be said that without Pease there would have been no Stephenson. It was the accurate workmanship of the Rocket, resulting from the trained hands in the Newcastle Locomotive Works, that stood Stephenson in such good stead on the day of trial. Both the Sanspareil, which by some was considered as good an engine as its successful rival, and the Novelty, broke down in the course of the trial at Rainhill, through some small defect in workmanship, and in the eyes of the whole world Stephenson's name henceforth became mainly associated with the locomotive. The Rocket presents very little difference in outward appearance from the engines of the present day, except in its small size. All the rods and working machinery, which heretofore, even in the Darlington engines, were carried high in the air over the boiler, were now placed lower down on either side of it near the centre of gravity, the cylinders being placed at an angle of 45° , and acting directly upon the driving-wheels, the spokes and fellies of which, strangely enough, are of wood. The Sanspareil, built by the late Timothy Hackworth, of Darlington, has only just arrived in the Museum, having been presented by Mr. John Hicks, of the Soho Iron Works, by whom it was restored to its original condition. This engine, after its defeat in the great trial, was purchased by the Leeds and Manchester Railway Company, and was

afterwards employed in the conveyance of passengers and general traffic on the Bolton and Leigh Railway until the year 1844, when, being found short of power for the rapidly-increasing traffic, it was removed to Mr. Hargreave's colliery at Cappul, near Chorley, where it was used as a fixed engine in winding and pumping. This work it did most satisfactorily until the end of the year 1863, when it was removed in consequence solely of the pit being exhausted. The engine is very similar in appearance to Mr. Headley's old Wylam engine, but it has one great improvement—the coupling of the wheels, instead of being accomplished by the cog-wheel arrangement underneath the boiler, was produced by a simple coupling-rod fixed upon the two wheels. In the perpendicular position of the cylinders, high up over the boiler, it resembled the Wylam engine, but the pistons worked from their under-sides, and in fixed slides, being a grand improvement on the complicated system of rods in that old engine. Possibly the Novelty, which was driven on the occasion of the trial by the present Sir Charles Fox, may also come here. The Commissioners then would only want Stephenson's first Killingworth engine and No. 1 Darlington engine, at present on a pedestal at the Darlington Station, to possess the most interesting group of locomotives in the world. There is one feature in the old Wylam engine which is worthy of notice. The fire-tube doubles upon itself, the chimney coming out beside the furnace door. This length of heating surface gave it an immense advan-

tage over all previous colliery engines ; indeed, neither Stephenson's Killingworth engines nor those that worked the Darlington line were so constructed, and consequently were so far deficient in power of getting up steam. In the Rocket, however, Stephenson, on the suggestion of the secretary of the Liverpool and Manchester line, adopted the tubular boiler, a plan of rapidly producing steam long before known, but which was now in a happy moment again employed with the best effect. It seems to be expected that the visitor who stops to inspect this interesting engine will be more struck with the fact that it killed Mr. Huskisson, of which he is informed by a written ticket attached, than that it inaugurated the first great passenger railway line, as if it were a more momentous feat to kill a great statesman than to annihilate space and time.

Under a glass case is a small model of a locomotive intended for the common road, patented in 1802 by Richard Trevethick and Andrew Vivian. This is supposed to be the first model in existence of a locomotive. But in the Museum of the Patent Office at Paris there is a model of a locomotive of long prior date, and in an adjoining church, now appropriated as a kind of hospital for old decayed engines, is the original locomotive that actually ran upon the road, but, in doing so, killed a man, and subjected the inventor to imprisonment. In this instance, however, the engine came to the man, and not the man to the engine, as was the case with Mr. Huskisson.

Scarcely less interesting than these great carriers of the cotton goods of Manchester is the group of worm-eaten old spinning-machines invented in 1769 by Richard Arkwright, the employment of which, having caused such an enormous increase of the cotton manufacture, may be said to have led to the introduction of the improved locomotive upon the Liverpool and Manchester line. The greater part of these machines are made of wood, now so rotten and decayed that they can scarcely hold together. The first machine was made by a watchmaker named King, of Warrington, and it is recorded that he hesitated long before he undertook the employment, so doubtful was the appearance of the inventive Bolton barber. The group of primitive-looking machines, the parts of which remind one of the works of a Dutch clock, include the original rap-wheel, the drawing-frame, the carding-machine, and the two spinning-machines, all of which were patented in 1769. The stupendous changes brought about in the cotton manufacture by these crazy-looking engines are almost inconceivable. The present prosperity of the spinning community of the north may be said to have been built up by this man. Although, perhaps, the least inventive of the many men who have given their minds to our great textile manufactures, he managed to combine the inventions of others into a more perfect series of machines than had ever before appeared, and to establish the spinning trade upon its present gigantic basis. He may have been a robber, as he is often termed, but at least he managed to rescue

the ideas of others from the oblivion into which they were fast falling, and to give them in combination to all posterity. What a pity these interesting machines are not supplemented by a model of Samuel Crompton's famous mule! As this cannot be obtained, the saw with which he worked in making the model of his machine is hung up in the Museum as a memento of his skill, just as the palette and brush of Wilkie are hung up at the base of his statue in the National Gallery, as instruments rendered sacred by his genius. Whatever may be the fate of the heterogeneous collection of patented and other inventions which crowd and encumber the present limited Museum, there can be no manner of doubt that the patriarchal engines we have noticed must form a portion of the new Museum to be attached to the Patent Office, whatever may be the principle on which it is established. "It is very difficult to get the first of anything," was the sensible remark of one of the witnesses examined on the Patent-Office Library and Museum Committee. We have here the first of those great engines which have moved the world, an interest attaching to them which all mankind can understand. The nation having once possessed them, they must remain the great attractions of any collection of machinery, patent or otherwise, Parliament may see fit to establish.

CROSSING THE MONT CENIS SUMMIT RAILWAY.

It is very easy to get into Italy ; the way is now made smooth and pleasant along the Cornice Road ; and the South, as you get towards Cannes and Nice, smiles upon you with a tropical vegetation, and a sun that even no hard winter deludes you into the idea that there is no such thing as frost or snow in the Italian peninsula round the corner which you are just turning. The palms and the date trees beckon you on into the sunny land of ruins and great memories : it is as easy for the traveller in the winter months to be tempted by the beneficent climate to get behind the Alps, which shut in, as with a gigantic screen, the Italian boot from the rigorous blasts of the North. My friend and myself were thus beguiled into the land of the great people last winter, and towards the beginning of the year we turned our faces homeward ; but we soon found that the amenities of the season were past, and that the ice-king reigns now and then in Italy with a fierceness that happily is tempered by brevity. When we found that we were frozen up in Venice, and could only get out of it by breaking the ice with long poles

to reach the railway station, it was time to turn from the fierce and fickle south to the true and tender north ; but we were met by the question, How to get there ? To go to Leghorn or take the steamer for Marseilles was to meet the terrible weather that is always brewing in the Gulf of Lyons ; to return by the Cornice was to make a duplicate and unprofitable journey ; and the passes across the Alps were all closed by the snow, or rendered so repellent by reason of the night journey across their Arctic summits, that my friend, who was both nervous and hypochondriacal, shuddered at the idea. But there was one way out of the trap ; the obstacle stood before him ; and although he said little, I saw that he shied at it like a nervous horse at a stiff bullfinch. Turin may be all well enough in the spring, but even then its regular streets, opening into each other at right angles, reminded one too much of a bran-new Yankee city to reconcile us to sojourn long within its walls. My friend, it is true, remarked upon the open cheerfulness of the town, "Such a pleasant resting-place after our cold journey ;" but I saw that it was but a very grim approval, and that he would give a great deal to be across the pass and out of the trap, if he could only screw up his courage to the sticking-point. What an awful thing it is to some natures to be imprisoned ! Even Rassalas could not stand it in the Happy Valley. My friend fretted and fumed, looked at his map—no ! there was no way of escaping that horrid cloud-capped range of Alps—then he took up the *Illustrated News* by way of comfort, but

was equally disappointed. How could his nerves stand the train skirting the edge of the tremendous precipices? It was a flying in the face of Providence! I knew how it would be. Just as I was in my second sleep my friend burst into my bed-room. "Haven't had a wink of sleep all night thinking of that bothering Mont Cenis; let's be off at once, and take it with a rush." "All right," I said, not half liking to turn out "unbewares" in that manner, knowing there would be cold comfort for breakfast. It was with many misgivings that he set out; but by the time we reached Susa, where the break of gauge commences, the summit railway being narrower than the French and Italian through line to Brindisi, he had recovered his composure somewhat. But it did seem to both of us little less than miraculous—accustomed as we were to the level gradients of English railways—how our engine and train of four carriages were to be lifted over the snow-clad range of mountains that towered up in front of us beyond the clouds to a height of 6,870 feet. The carriages, which are first, second, and third class, with one luggage-van between the latter and the engine, are constructed upon the American or omnibus plan; that is, the passengers sit opposite each other in a line with the rails. There is not too much room even in the first-class, which only accommodates twelve passengers, the length being 14 feet 8 inches, by 6 feet 6 inches in width; but this size gradually diminishes as you get to the third-class, passengers at the small fare of course not being expected to possess such breadth of form as

their betters. It certainly looks more cosy to be seated omnibus-fashion, and by an arrangement of small platforms, upon opening the doors at the ends of the carriages, the passengers can walk from one end of the train to the other. I observed my friend noticing one peculiarity of the carriage as we entered it: the windows were so high that unless the passenger stood up, he could not see out of them—a hint to reassure nervous people, thought I to myself. There is nothing in the appearance of the engine and carriages remarkable, unless it be their lightness. Mr. Fell had to solve the problem of soaring upon iron wings through the clouds. How was he to accomplish this? By imitating the lightness yet the strength of the bird's frame. The locomotives that climb ascents such as no engineer before his day ever attempted are by a special contrivance fitted for the duty.

The ordinary locomotive travelling upon comparatively level ground obtains its grip upon the rails, which enables it to convey heavy loads by its weight; but he had to abolish weight, and yet to obtain the power to climb the mountain, with gradients so steep as 1 in $12\frac{1}{2}$, or much steeper than the worst part of old Holborn Hill—to climb like a mountain cat by the sheer force of its grip upon the middle rail. I looked for this rail when we first changed carriages, and was surprised at not being able to find it; but for the very good reason, that the climbing rail, as it may be termed, is not laid down until the real stiff climbing commences, which does not take place until the train has left Susa many

miles behind. Presently the sides of the mountain ravines fold and overlap each other, and along the easiest gradients that could be found the old diligence road over the Mont Cenis pass is carried, and on the outside, or the precipice edge of this grand military road, made by the Emperor Napoleon's engineers, the rails are laid, and the railroad runs. Now this arrangement is highly picturesque, but is certainly a trial to the nerves of the boldest traveller, especially when he knows that the width or gauge of the rail is only 3 feet 7½ inches, whilst the carriage he is sitting in is 6 feet; in other words, that when he is sitting with his face to the mountain side he may be sure that he is overhanging the precipice, for in places the rail runs absolutely on the extreme verge of the pass, with a sheer descent of upwards of 2,000 feet. As the summit of the mountain is attained, the windings of the road become more complex, and the passenger is surprised at the rapid changes of the scenery that in consequence take place; and it is during these short turns that he perceives the arrangement of the third central rail is adapted. This rail, it may be stated, performs a double duty: it not only enables the wheels of the locomotive and carriages horizontally to grip it on either side, so as to climb, but it also prevents the train from flying off the rail whilst doubling upon itself during the rapid curves. It is a very curious sight to watch the train writhing like a snake as it passes these rapid turns, the tail or hind' carriage, when there are only perhaps five, being perfectly visible to those on

the engine and leading carriages. The scene changes, as we have said, with the rapidity of transformations in a pantomime. One moment the passenger gazes with wonder upon rifts in the mountain pass, that show here and there upon their green ledges, low down through the pale haze, hamlets that look exactly like toy towns; the next turn takes him into the shadow of some towering precipice, between the crevices in which the sudden frost had solidified the falling cataract; pendules of ice, a hundred feet long, glistened in the sun, the water as it fell from some ledge of rock having been suddenly arrested. In other places the foaming water-falls, dashing in every direction at the magic waving of the wand of King Frost, had become as solid and as still as though they were merely painted in a picture. It is difficult to express the strange sensation experienced at beholding this sudden arrest of the noise and motion we associate with rumbling cataracts. But I have forgotten my friend all this time. He had carefully taken the side of the carriage that looked from the precipice; but he had not calculated the rapidity with which he would be turned about, neither did he notice the end doors, which the more adventurous and strong-nerved began to open as the prospect burst upon us in all its sublimity. It was clear there was no shutting out the terrible bogey that had kept him awake night after night. Moreover, the familiar manner in which the passengers lounged out on to the platform, and chatted with the guard, who, in a very unofficial manner, smoked his pipe, by degrees put

every one so much at his ease, that he speedily became himself reassured, and before we had gained the summit looked as unconcerned at the terrible road as any one else. The train has to stop several times before the top of the pass is reached to get water. But a small supply is taken with the engine, on account of its weight: this involves a greater delay than would be otherwise necessary. As the summit is neared the railroad leaves the ordinary road, and makes a more convenient cut, which is less liable to suffer from avalanches. This new line gives the traveller a fine view of the *Echelle du Diable*, or Devil's Ladder, showing the extraordinary winding nature of this part of the old road, doubling, as it does, up the side of the different ravines, and passing over miles of ground to gain what seems to be a very trifling elevation, the whole course appearing to be contained within an area measured by a few thousand yards. In order to mark out the road, which, when a deep snow has fallen, is of the utmost importance, stone posts are thickly planted along its sides; and these lines of posts, when viewed from a little distant elevation, such as is gained by the new line for the railway, make the Devil's Ladder look like a coarse ribbon or rope that had been thrown carelessly on the ground, making coils and curves, winding about in the oddest kind of flourishes. The precautions taken against avalanches are very great, and very necessary, inasmuch as the rail, running for the major part on the outside of the ordinary diligence road, is exposed to the greatest danger; a single fall of the thousands of tons

that a mere whisper sometimes brings down from the overhanging rocks being sufficient to sweep the whole train into the depths below. To avoid this danger, solid stone refuges, at the most dangerous parts, have been erected, which act as shields to turn aside the avalanches; indeed, in nearly every exposed part of the road a roofing of galvanised iron has been erected, the whole length of which extends for six miles. I confess that this roofing seemed to be of a very unsubstantial character, and by no means sufficient to support any great weight of snow. It is true this slight kind of roofing is not exposed to any of the terrible vertical falls of snow which have a crushing effect; but they are liable to be filled with the drift, an occurrence which has actually taken place on many occasions, the tunnel having been completely filled by the snow, and frozen into a compact mass.

The fear of the train leaving the rail is not very great when it is climbing, as the speed is of course but low; but in descending it is otherwise, and were it not for the central rail, which holds it to its place, it could not take the fearfully short curves it does without going off the track; but the powerful brakes, which can be applied to every carriage as well as to the engine, not only arrest the vertical wheels, but put a grip on to the central wheels, which hold on to the central rail with a power of adhesion equal, if necessary, to thirty-four tons. The rush down the steepest incline is deliciously exhilarating. You feel, or fancy you feel, that the slightest thing would shoot the whole train

off the rails and down the abyss, but there is no fear felt by any one. There is a sensation of rush, such as is felt on the downward sweep of a swing, the carriages rattle, the coupling-chains creak, and the whole machine slides like a boa constrictor round the sinuous tourniquets with an irresistible might, which contrasts strangely with the diligence that is seen toiling with twelve horses in the road alongside; for we may say there are some old-fashioned people who still cling to the old ways. Whilst in the full swing of our descent a low bumping sound was heard, and the guard started from his listless attitude, crawled round to look at the engine, and instantly screwed rapidly at the brake; the other guards and the engine-driver did the same, and the train was brought to a stand-still in about thirty yards. We all got out to see what was the matter. The coupling-rod of the driving-wheel had broken loose, and had thumped a hole in one of the plates of the framework. It might have been worse, and we were very thankful that the brakes were so effective. The engines at present in use are not powerful enough for the work, and the engine-driver, a Northumberland man, told us, "She is allas a-breaking down." A new engine had to be telegraphed for, causing a delay of one hour. With the new horse we swung down to the last station, St. Michel, pleasantly enough. During our passage we just caught a glimpse of the ends of the tunnel they are cutting through the mountain called the Grand Vallon, the narrowest of the Alpine chain just here.

This tunnel, which will be nine miles and a half, is the grandest piece of tunnelling that has ever been undertaken. As we neared St. Michel, the apparatus for conveying the compressed air by which the boring machines are turned upon this work are very conspicuous. When the tunnel is completed, of course, all the fast through traffic will pass through it, but we question whether the summit railway will not still be in use for tourists and those who enjoy picturesque travel. The difference of time will only be two hours and a half, and those who have that commodity lying upon their hands will surely prefer climbing up amid the Alpine snows to rushing in the dark through the bowels of the earth. Mr. Fell, the Englishman—we are particular in mentioning his nationality, as he is mistaken for an American—is, we believe, in treaty for the construction of similar mountain railways over the St. Gothard and the Simplon passes, and he has undoubtedly conquered the difficulty of mountain travelling. In England that seems a small matter, but in those regions of the globe where vast volcanic upheavals render the populations of neighbouring states as utter strangers to each other as though they lived at opposite ends of the earth, his invention will advance civilisation by centuries, and add immensely to the national wealth of the world. When we were comfortably warming our toes at a blazing wood fire at the inn in Chambery, my friend up and spoke quite briskly: “I didn’t do that so badly after all, did I?” to which I heartily agreed; and, by way of tag to this

paper, let me remind all nervous people that there is no need to shy at this locomotive steeple-chase leap over the Alps out of Italy, for they may take it with a delightful sense of security, and be able to boast that they have been above the clouds in a railway train.

NO WATER ON SUNDAYS.

It has been pertinently asked, What should we think of our gas companies if they stinted us with regard to light one day in the week—cut off our gas, in short? Yet this certainly happens to us one day in the week at least with regard to a far greater necessary of life—water. Both the rich and the poor are alike sufferers by the present intolerable intermittent system of supply; but to the poor the evil is so great that we are astonished the outcry has not been greater. Those who know the back courts and slums of London are aware that before the Sunday has well commenced the miserable water-butt that serves the houses of the poor, crammed from roof to floor with lodgers, is exhausted, and the spectacle is afforded of crowds of poor creatures rushing about in search of water to cook their meals or to quench their thirst. Like the Ancient Mariner, they may cry, “Water, water everywhere, and not a drop to drink.” Those who are more provident store away their supply in any receptacle they may have at hand. Here, exposed to the fetid exhalations of a whole family crowded into one room, it absorbs with fatal facility all the elements that supply our

hospitals and dispensaries with typhoid and other low fevers. That the poor, thus starved of water, or condemned to drink it when so impure, should resist the allurements of the public-house or the gin palace, is more than can be expected of human nature. By Act of Parliament we legalise a vicious system, which drives men and women to indulge in strong drink, and then by Act of Parliament we punish them for what we are pleased to term their gross indulgence in a brutal and degrading propensity. As for the means of washing themselves, that is wholly out of the question. The great and crying evil of the intermittent water supply thus touches all sections of the social scale, and we are glad to see that the association established to give us a constant supply in place of it is making active exertions, by means of petitioning, to bring about a reform, which has worked so well in the principal large cities of the empire. The water companies, rejoicing in their present monopoly, unite to oppose any reform whatever, and in the face of the experience of Manchester, Glasgow, Edinburgh, Birmingham, and a score of other great centres of industry, argue that with a constant supply the waste would be so great that they could not furnish the water at the present rate. Experience is against this argument. In Hull, where half of the town is supplied on the intermittent system, and half on the constant system, the waste is found to be greater in the former than in the latter; and the reason is close at hand. The elaborate system of cisterns, with taps and ball-cocks, presents a machinery

which is not only calculated, in the hands of the ignorant and improvident classes, to get out of order, but portions of the machinery itself can with difficulty be preserved from the pilferer. A metal tap to the water-butt is the weak point of the whole system—it is sold for a glass of gin, or the ball-cock which regulates the inflow is nefariously detached; hence the water, when turned on, is constantly flowing away to waste. Where the supply is on the constant system, a self-acting iron lever is used, of the most simple construction, incapable of getting out of order, and offering no temptation to the thief; hence there can be little or no waste. The present enforced storage system is productive of other evils besides those causing an artificial scarcity. The water in them is necessarily foul. All its impurities are deposited at the bottom and on the sides of the storage vessels. The filthy condition of the ordinary house cistern may be ascertained by any householder by putting his hand into it when it is nearly empty. The slimy residuum is, of course, stirred up immediately the daily supply comes in. If such is the state of things where the cisterns are under cover, the condition of water-butts in back courts, where the impurities of the atmosphere are added, may be imagined.

Whilst the metropolis is stinted in quantity, it is charged at a much higher rate than in other provincial cities. The water-rate in London varies from 6*d.* per thousand gallons when supplied to the brewers and for other manufacturing purposes, to 1*s.* for

the same quantity when supplied to private houses ; whereas a much purer supply can be obtained at about $4\frac{1}{2}d.$ for the same quantity in Manchester, and in Glasgow the rate is only $3\frac{1}{2}d.$ In the former town the adoption of the constant system has resulted in a saving of 7 gallons per head per day—a most triumphant answer to those who assert that there is less waste under the storage system. The method of rating adopted by the metropolitan companies is also very unjust. Like the poor-rate, it is computed according to the rental of the house to which it is supplied, not according to the number of persons receiving it. Thus one household, numbering perhaps twenty individuals, pays no more than possibly the one adjoining, in which there may be but three or four persons living; the small household not only consuming a fourth of the supply used by the more numerous family, but that of an inferior quality, inasmuch as the cistern is constantly full of water which is never renewed.

The water companies, fully aware of the weakness of their position, in the Act passed in 1862, voluntarily agreed to give a constant supply upon the demand of two-thirds of their ratepayers. This was a cunningly-devised scheme to stave off opposition, as they well knew that their clients could not be easily polled to ascertain their desires. Busy men are not inclined to sacrifice their time for a collective force of this nature, and the machinery necessary to effect it would be of too expensive a character.

If the Association for the Constant Supply of Water

should be defeated in their efforts to give us *ad libitum* one of the first necessities of life, or fail in their application to Parliament in the next session, it will be a legitimate question for the consideration of the rate-payers whether the monopoly of supply in such an article ought to be permitted. Mr. Ruskin has vigorously combated the right of railway companies to hold in their own hands the principal means of locomotion. It might with much more reason be asked why public companies should be allowed to make a profit out of the rain that falls from heaven; why the noble river, which now forms the chief source of the metropolitan supply, should be handed over for nothing to a set of men to traffic in and turn to profit. Surely the duty of supplying water to a city should belong to local government, and should be provided at the lowest possible cost. That shareholders should be pocketing their five or seven per cent. is surely an absurdity when such a necessary of life is concerned. We believe that London could be supplied at a much cheaper rate than it is at present: there can be no doubt that if it were vigorously demanded a constant supply would be immediately granted.

MOVABLE FEVER HOSPITALS.

THE records of the Board of Health exhibit periodic outbreaks of contagious fever, which, without any apparent cause, ravage country towns and villages which, from their open and generally healthful situation, ought to be exempt from such attacks. Only four years since the blight fell upon Terling; since then Guildford has been the nest and centre of scarlet fever. When such epidemics occur, according to present arrangements, the county hospital is the only refuge to which the patients can be conveyed. It is needless to say that these establishments are the worst that could be selected for such cases. Patients already worn by disease are singularly prone to receive into their blood any infectious poison that may be within reach. To draft off, therefore, typhus fever or scarlet fever patients to such hospitals is as disastrous as to fire a live shell into a powder magazine; the result must be to multiply and intensify the disease a hundredfold. Yet to permit the sufferers to spread the contagion in their own homes, or in the homes of their masters, as in the case of domestic servants, is equally intolerable. The difficulty of the case has been met, we think, by Mr. Napper, of

Cranley, who suggests the establishment of movable iron hospitals, which may be so constructed as to be capable of any extension in order to suit the severity of the visitation. We are all familiar with movable corrugated iron churches, calculated to meet the spiritual wants of an unsettled neighbourhood; and the same material, so constructed as to be easily taken to pieces and put together again, would be admirably adapted to travelling hospitals. The great advantage of iron is that it can be easily disinfected and purified, after having done its work, by a coat of paint. Such hospitals could be packed in vans, and despatched at a moment's notice by railway or road to the infected town or village requiring their services. Sites for these hospitals—as they would only be temporary fixtures—could be obtained without any difficulty; and the whole expense of their use, together with that of trained nurses, would be readily met by the township or community among which the outbreak might chance to occur. It would be imperative that these travelling hospitals should be under the management of some central fever hospital, say in the neighbourhood of London, where trained nurses would be ready at a moment's notice to form the working executive of the hospital, and from whence, if necessary, medical officers could be obtained to take the management of ventilation, diet, and remedies. In civil communities, as well as among armies, moments arise in which the destroying angel suddenly smites the ranks, and the idea of the circulating ambulance is as appropriate in the one case as in the other. We

must, in short, bring the hospital to the infected, and treat them in the field, as it were, instead of allowing them to spread the malady among the healthy portion of the community. Mr. Napper's idea seems so valuable that we trust it will attract the attention of the Board of Health, whose presiding officer, Mr. Simon, but too well knows the mortality that yearly occurs through the bad drainage, bad water, and bad housing of many of our small towns and villages, where the gifts of Nature are more than counterbalanced by the neglect of all sanitary precautions. In the larger cities these details have been forced upon the authorities; in the scattered country neighbourhoods, however, where we expect to meet with every condition of health, our experience proves that there is a lamentable deficiency. Privies are found draining into the wells, cesspools are never emptied, and the water becomes stagnant. In many a cottage, where the rose climbs over the porch in luxuriant growth, the children sicken and perish, or spread the fatal fevers the travelling hospitals now suggested are calculated to meet and vanquish.

THE SPECIAL DISEASES OF ARTISANS, &c.

THE fact that one of the last Reports issued by the Commissioners for the Employment of Children treats mainly of the evil conditions under which a large class of the adult artisans of Sheffield labour is significant. It must indeed have been a very serious case that could have induced them to transfer their own proper sphere of inquiry to another quarter; but, in truth, the case of the Sheffield knife-grinders has been so long notorious that we are by no means surprised they have at length brought the matter officially before the Government. Indeed, there seems to be no reason why Government should delay turning their attention far more than they have done to the conditions under which adult artisans labour. They are supposed, it is true, to be free agents, but, practically, they are little more so than the children Government has so properly taken under its protection. Artisans working in factories, mines, &c., are, to a certain extent, subordinate to conditions over which in many cases they have but little control. They are but part of a great machine, the human cogs in a system of labour employed for the production of certain articles. When,

indeed, they possess the means of obviating the adverse conditions under which they labour, they are often so ignorant or so indifferent to the evils which affect them that, to all intents and purposes, they are no better than children with no wills at all. Let us instance the knife and fork grinders of Sheffield, whom we have heard so much about in the late Social Science meeting in that town. Dr. J. C. Hall, who, by his persistent efforts on behalf of these poor people for the last ten years, has at length forced the public to listen to him, in his late address, which we have before us, presents a startling picture of their sufferings. For instance, he tells us that the loss of metal in grinding a dozen razors is five ounces on the dry stone, and that the stone of seven inches in diameter will be reduced nearly one inch. This mingled mass of jagged steel and stone is thrown off by the very nature of his work directly in a line with his mouth. "When at work the grinder mounts what he calls his 'horsing.' This is a long, narrow, wooden seat. His elbows rest upon his knees, and his head, particularly when employed on very small articles, is bent over the stone." Not only is he forced to maintain this position in the ordinary course of his work, but by some extraordinary misarrangement he is forced to prepare his principal tool, the grindstone, himself. Dr. Hall tells us that the grindstones are received from the quarries in a rough state, and the artisan, before using, is obliged to "hang and race" it. This operation is performed by causing it to revolve slowly against a bar of steel in order

to make its surface smooth and level. This operation fills the room with dust. Here, then, we have a contrivance directly calculated to produce consumption, and the result exactly tallies with the care taken to bring it about. In fact, the average age of a dry grinder is twenty-eight years. When they get much beyond this age it is considered a notable fact. A young man, aged twenty-six, once remarked to Dr. Hall that he reckoned in about two more years at his trade he might begin to think "of dropping off the perch; you know a fork-grinder is an old cock at thirty."

We all know that there is a stringent Act of Parliament compelling masters to box off dangerous machinery. Now, the danger to life from this source is trifling compared with an arrangement by which volleys of siliceous gritstone and steel dust are being driven into the worker's lungs during the whole period of his working life. It is, we know, urged by the masters that fans have been contrived which act very effectively in conveying this dust out of the hall or work-room; but it is useless to leave such preventive means to the men themselves; neither, indeed, do we see that the masters have any right to expect it. The labourer certainly has a right to demand that every precaution should be taken to secure him from dangers resulting from the tools he is using; and the Legislature, indeed, admits as much by the careful inspection it makes of miners in their workings. The Sheffield knife-grinder, from long habit, appears to be reduced to

such a hopeless state that it is useless to look to him to take the least care of himself. "Generation after generation are ground off on the wheel," to use Dr. Hall's expressive term, and yet the wheel goes on doing its deadly work as of old. When a young man of twenty-two came ill to the dispensary, to the inquiry, What is the matter? the reply was, "I grind razors, and have got what I shall never get *shut* on." To ask such men to take any precautions to save their lives is a farce; indeed, some of them rejoice in the deadly nature of their occupation. "Trade is bad enough," they say, "and if men lived longer it would be so over-full that there would be no such a thing as getting a living." Can there be any question that Dr. Hall is right in suggesting that it should be made a finable offence to allow any man to grind without a fan, and that the fan should be provided and kept in order by the master? Surely, when a metal wheel is not allowed to revolve in an exposed condition for fear of causing an accident, a stone wheel should not be permitted to send a race of workmen to their last home in the days of their youth for the want of a simple fan, which would not cost the master £5 at the utmost. We are informed that the Messrs. Rodgers, whose cutlery is known the world through, and the proprietors of the Union Wheel, will not permit their men to work without a fan, and that, as a result, the average ages of their workmen, working at the wet and dry wheel, were respectively forty-nine and forty-six. The neglect of all precautions is mainly attributable to the

poverty of the small masters, who abound in Sheffield, and in order to secure the enforcement of the use of the fan in the halls of those manufacturers a system of inspection would, without doubt, be necessary. That almost perfect immunity from the effects of steel dust, even when grinding with the dry stone, can be effected, we ourselves know. The needle-makers of Redditch, in Worcestershire, equally with the razor-grinders of Sheffield, use this stone, but the artisans are a healthy, robust class, in consequence of the use of the fan in all the large manufactories of the town.

It may, perhaps, be possible to include all the dust-making employments injurious to health under one enactment. Wherever small particles are plentifully given off, without the means of thoroughly flushing them away from the worker by strong currents of air, there the artisan is sure to suffer some of the more serious symptoms of lung disease. The making of cocoa-rind hafts or handles for knives in Sheffield is an instance in point. The workmen, says Dr. Hall, suffer from a species of hay asthma, or from a skin disease, the result of the sealing up of the pores of the skin. Stonemasons, again, are a comparatively short-lived class, especially those in Edinburgh, who work upon granite, and thereby fill their lungs with the ragged pieces of grit detached by the chisel. Millers, working in places filled with flour-dust, pearl-button makers, the shoddy-grinders, and foreign hair preparers or dressers, are all sooner or later damaged in their lungs by reason of the irritating dust they inhale

while at work. The shoddy fever is as well-known a trade disease among the shoddy-grinders as the grinders' rot is in Sheffield, the process of tearing up old rags by means of the devil filling the air with fine particles of dust, frequently of a very filthy nature. The fluff of flax-mills, again, is very destructive to health; and, lastly, we would refer to the scourers in the Potteries, who work in an atmosphere loaded with the dust of pulverised flints, one of the most irritating foreign bodies that can be received into the lungs. The extension of the Factory Act has given the power to inspectors of earthenware manufactories to enforce certain rules of ventilation and cleanliness in the workshops, and we see no reason why the Legislature should not extend its provisions to all workshops in which dirt is given off to the detriment of the workers. In all open-air trades the wearing of the moustache and beard—those natural respirators—would be an admirable preservative against disease; but because it is a natural one, easily adopted, and entirely dependent upon the will of the workman, we fear it will be little put in practice. The manufacture of arsenical paper is so highly injurious to the workmen, the hangers, or the purchasers of these papers, that we really see no reason why it should not be prohibited by law. After sitting in a room hung with this emerald-green paper, a feeling of languor creeps over persons which they little understand. The eyes and nose run, and the individual suffers apparently under the effect of a bad cold; the throat becomes sore, and the general

health is seriously affected. The hangers of these papers always complain of feeling ill after putting up pieces of the paper, and the artisans employed in its manufacture are affected in a like manner. The reason is obvious. The large amount of the aceto-arsenite of copper, which produces the brilliant tint, is easily detached from the paper by the clothes brushing against the wall, and this settling upon the furniture, books, &c., is set floating in the air with every movement. Why should such a deadly poison be allowed upon our walls, while the individual would be denied the smallest dose at the chemist's without a medical man's order? The use of this pigment, again, in the manufacture of artificial flowers is, we know by the coroners' inquests, but too often fatal; but we suspect that the fashionable fair will be the last to care what becomes of the poor girls who minister to their vanity. There is, however, an emanation given off on another manufacture, which we are all interested in, from the highest to the lowest in the land. The common lucifer match is responsible for one of the most terrible diseases which can afflict humanity. In the act of manufacture the phosphorus becomes volatilised, and the fumes attack the bones of the jaw of the workers, and in some cases entirely destroy them. The process in which the workmen are liable to this emanation is that of dipping the match into the melted phosphorus. Without doubt the law would enforce precautions which would protect the artisan from this shocking disfigurement, and in some cases the painful

death, resulting from working in the present factories. At all events, the public may take the matter into their own hands, as there is now coming into use a well-known match produced without the use of phosphorus at all, and in which, consequently, the workmen escape all danger. But what shall we say of the workers in lead? Dr. Hall has given us in his address a picture of the file-makers' disease in Sheffield, which arises from the dust given off every time the file, which rests upon a bed of lead, is struck with the chisel, and from the habit the men have of handling the lead with the rest-finger and thumb; but this incidental contact with lead is by no means so injurious to health as the process of manufacturing white-lead. In fact, in one form or other, the use of lead is so interwoven with our manufactures that its effect upon the nervous system is especially injurious, because so insidious in its action. The file-maker suffers from it, as we have said, the part usually affected first being the finger that rests upon the lead, which becomes numbed or paralysed in the nerves of sensation; the house-painter's finger which touches the brush suffers in a like manner; the potter, again, who dips ware in the glaze—a preparation of lead and flint—suffers in the same manner; even the compositor finds that his fingers which pick up the type become cold and feelingless. In all of these cases the artisan should take timely notice of this fact, as it is the sure precursor of that distressing complaint to the working man—the “dropped hand,” or paralysis of the ex-

tensor muscles of the wrist, which sometimes disables the bread-winning digit for months. But there is still another danger from working in lead: the effects we have spoken of are the results of touch, but there are constitutional symptoms, such as colic and obstinate constipation, arising from reception of the lead directly into the mouth. The painter, for instance, will eat his dinner with his unwashed fingers; the file-cutter, as we have seen, wets his finger and thumb, while handling the lead for the dipper, through the contact of the metal with his skin, brings on saturnine poisoning, which in extreme cases ends in fatal mania. These constitutional symptoms are wholly preventible by changing the dress or washing the hands before taking meals; but this, again, is so simple a preservative, that it cannot be depended upon unless the master is induced to enforce these precautions.

These diseases, however serious to the individual, cannot well be prevented by any systematic Governmental inspection. It is only where men work in large numbers together, such as in factories and mines, that the conditions under which they work can be controlled and directed by law. Possibly the metalliferous mines of Cornwall, Devon, and the North of England present examples of evil conditions for the workers in them second only to those existing in the Sheffield halls of the dry grinders. The amount of mortality among these miners has long been a scandal, and we rejoice to find that the Commission appointed by her Majesty to inquire into their condition has issued a

Report which cannot fail to produce an amelioration of their condition. The life of a collier is not to be envied, working as he does in the dark, and in many cases in foul air, breathing a dust that fills his lungs with carbonaceous deposits, and giving him what is known as the "black spit;" but his occupation is a healthy one compared with that of the Cornwall or Devonshire miner, employed in procuring copper and lead from extreme depths. The Report which lies before us discloses a most dismal state of things,—a very large segment of the population devoted to occupations in which a man is considered old who reaches the extreme limit of fifty years! The metalliferous mines, as a rule, are very badly ventilated. The air in various portions of different mines having been analysed by Drs. Taylor, Angus Smith, and Bernays, we find from the Reports that only in 10·65 per cent. of these the air may be considered normal, that is, possessing 20·9 per cent. of oxygen, while 24·69 per cent. are impure, and 65·63 are noted as exceedingly bad. Perhaps some of us have ventured for curiosity into the gallery of a London theatre, and speedily escaped, half poisoned with the vitiated air. Now, according to Dr. Angus Smith, the air in the gallery of a theatre at half-past ten P.M. contains 20·67 per cent. of oxygen; in nineteen of the specimens of air extracted from these houses there was only 19 per cent., and in one instance it was as low as 18·27 per cent. Gentlemen who yawn and retire with a sick headache after the languid enjoyment of the opera may therefore guess at the

conditions under which our metalliferous workers labour for eight hours of the day for the term of their natural, or, more properly speaking, unnatural lifetime. But bad air is not the only difficulty they have to contend with. The heat of some of the deep mines is so great that they are obliged to work naked, and to have cold water thrown over them at times to revive them : 80° or 90° is not an extraordinary temperature for a deep mine, and in one case it reaches to 110° ! The perspiration of the poor miner is so great that he sometimes loses as much as ten pounds' weight during his day's work. The only test the miner has of the condition of the air in his working is the burning of his candle : as long as it lives he thinks the air is good, but it often happens that at the end of workings it goes out from want of oxygen ; but even this warning is not heeded by the men, for they will often place the candle eight feet or ten feet distance, where the air is pure enough to allow of labour, and then they will go on working by its light in the foul air. It would really seem as though the perversity or the ignorance and neglect of men had heaped together the greatest number of adverse conditions to health : poisoned by the lack of oxygen, weakened by the intense heat, rendered asthmatic and bronchitic by the carbonaceous matter received into his lungs, after his exhausting work, day by day, his only means of reaching the upper air is by a system of ladders, up which he has to climb, in some cases, a height of from 1,200 to 1,680 feet ; or perhaps the reader will be better able to

realise this labour if we say that he has daily to climb, in many instances, higher than Snowdon before he sets his feet upon the grass or begins his journey home. This perpendicular climbing, in the miner's exhausted condition, is the cause of an enormous amount of heart disease, and this, together with the pulmonary affection which he contracts in the course of his daily labour, produces a mortality, the frightful nature of which will be best estimated by the comparison the following table affords with other males at the same ages of life, calculating the deaths per 1,000 :—

Ages.		Metal Miners.	Males, Exclusive of Miners.
Between 15 and 25 years	..	9·53	.. 7·57
„ 25 „ 35 „	..	12·38	.. 9·19
„ 35 „ 45 „	..	17·64	.. 10·13
„ 45 „ 55 „	..	33·11	.. 16·18
„ 55 „ 65 „	..	78·34	.. 29·38
„ 65 „ 75 „	..	127·52	.. 66·10

It will be observed that the mortality becomes enormous, as compared with other labourers in the same district, between the ages of 55 and 65, and 65 and 75. And the loss of life among middle-aged miners is not the only loss to the community ; the loss of the labour of the best and most experienced men, in some mines, is almost total. After a certain time of life the miner can no longer climb the interminable ladders. Thus, just at the time their experience would be valuable to the proprietors, they can no longer work in the depths of the mine. In some cases, where there are man-machines to lift the men without exertion to the surface, these middle-aged men can labour as when

younger—a proof that the present deficient mode of access and egress is not only a source of disease, but causes the loss of the most valuable mining labour.

Among the more important recommendations of the Commissioners, in conclusion, may be noticed the following:—That every mine should be provided with proper houses, conveniently situated, in which the men can change and dry their clothes; that in order to avoid the evils consequent on climbing ladders, mechanical means should be provided to convey the men to and from the surface when the mines are of great depth; and that, as a general rule, no boys under the age of fourteen years should work below the surface.

That these recommendations have been most imperatively called for there can be not the least doubt. Let us hope that the time is not far distant when human labour may be superseded in both coal and metalliferous mines by machinery, which can take no harm by either bad air or hard labour, and that the miner will be emancipated to a great extent from work which reduces him to the condition of a mole for the greater part of his dismal life.

THE POST OFFICE.

POSSIBLY there is no Government department which so clearly shows the increasing vitality of this empire as that of the General Post Office. The correspondence of a country is at once a test of its commercial activity, its social intercourse, and its educational status. For this reason the annual Reports of the Post Office in general interest rise far above the average of official returns. The history of the Post Office is, in short, a history of the progress of the nation, full of very important results, and crowded with very interesting details. Of the vast crowds that daily skirt the doors of the great office at St. Martin's-le-Grand, how few there are who know anything of the working details of the establishment which brings tidings of grief or joy to every household—which for a short time holds in its keeping the secrets of a large portion of the correspondence of Englishmen!

As we are about to write a page only of the history of the Post Office, we shall select that one which refers to its later development—to the period that has elapsed since the great revolution was effected in its management by the reform brought about by Sir Rowland

Hill. Like all great reforms, however, the change in 1840 had its root in previous changes in the machinery of the establishment. As long as the sight continued which formed one of the great metropolitan shows, the departure of the mail coaches from the yard of the Post Office, the penny postage reform was impossible. The true reformer was the locomotive, and when the first railway was opened from Liverpool to Manchester, the change that has opened the post to all classes of the population was really inaugurated. By the year 1839 the railway system was spreading rapidly throughout the kingdom, and in that year the grand procession of twenty-eight mails, which nightly left the Post Office, was reduced by the opening of one railway line nearly one-half, no less than thirteen of the mail coaches running north in that year transferring their loads to the North-Western line. While it must be conceded that a change of circumstances brought about a change of measures, the revolution planned by the great Post Office reformer was immediately successful. The number of letters, which in the year 1839 was estimated at 75,907,572, in the very first year of the reduced tariff increased to 168,768,344, and has gone on increasing without a check to the present time in a higher ratio than the increase of the population. In the year, 1865 the number of letters had risen to 720,000,000 the books and chargeable newspapers, the samples and patterns making a total of 818,990,000 the year by the Post

had probably increased, by the end of the following year, to the magnificent proportions of 1,000,000,000. Such numbers as these stagger the imagination, and we may be sure that the machinery by which these myriads of letters are distributed moves with perfect smoothness and ease, for any stoppage would throw the whole correspondence of the country into the most inextricable confusion. The sorting-rooms of the General Post Office on Friday evenings, before the despatch of the night mails, present a most curious sight. Hither is brought the entire correspondence of the metropolis, and of the country districts around, that has to be passed through London, and, in addition, hither are brought such letters as are posted in the Central District for metropolitan delivery. Of these latter only those which belong to the E.C. district are delivered from the Post Office, letters for all the other nine metropolitan districts being forwarded to them in bags, each district being now considered as a post town, sorting and delivering its own correspondence, and interchanging bags one with another. This distribution of the letter-sorting and delivery has relieved the central office of most of the work it had to perform, when, in the old days of the penny post, every district letter came to the head office for distribution; but the vast increase of the general letters for the country has made up for this diminution of work, and at five o'clock, say, on a Friday evening, the sorters are all at their posts, and the labour of arranging the letters into the various roads and districts commences.

The speed with which this operation is completed is extraordinary, the long range of pigeon-holes which face every table are speedily filled, and then the letters are stamped. In order to enable the authorities to trace letters, every stamper is supplied with a fresh stamp before commencing work. This he signs for; consequently the envelope will at any time bear witness through whose hands it has passed previously to delivery. The book and sample-post sorting is carried on at the same time; and if the publishing day of the Magazines should happen to fall upon a Friday, the strain upon the office is greatly increased. The size of the book packets allowed by law is extremely liberal: parcels two feet by one foot square are permitted to pass, and the number that do go through the post testify to the great labour that falls upon the postman. The penny post for the conveyance of letters and parcels about London and its suburbs was established as early as 1683, by an upholsterer named Murray, and on its first starting parcels were not limited in weight. This was a more generous arrangement than the present parcel post, but it gradually became much restricted, and one Dockwra, who afterwards conducted the undertaking, was charged with forbidding the taking of any bandboxes (except very small ones) and all parcels above a pound; so that in respect of the carriage of parcels we have not made a very great advance, but then the numbers have enormously increased. The sample post, established in 1864, has been taken advantage of by merchants and tradesmen to a very large extent. In

1865 no less than 1,280,000 samples and patterns went by post. The majority of these samples consist of produce, such as tea, sugar, coffee, hops, seeds, corn, beans, &c., but every conceivable article under the allowed weight, from mouse-traps and clock-works to leeches and Pharaoh's serpents, now passes through the Post Office. These samples are sorted on the same counters with the letters, and their bulk of course is far greater. Attempts are made to burden this department with very odd articles—a limb for dissection not long since was discovered by its smell, and rejected. Letters and parcels, when sorted, are sealed up in bags and despatched by eight o'clock to the various railway termini. We must mention, however, that the sorters can never depend upon the amount of work they may have to perform, as occasionally advertisers will swamp the tables with small packets and printed enclosures. Thus, in 1859, the Sacred Harmonic Society and the Crystal Palace Company posted in one day at the central office 400,000 circulars; and while we were watching the process of sorting the other evening, 100,000 circulars came in as a disturbing element in the machinery of the office. There are, however, certain regular irregularities. For instance, on Friday evenings there is a vast increase of Newspapers, consequent upon the despatch to the country of the weekly newspapers. On Saturday, again, there is a great increase of letters, consequent upon the Sunday closing of the Post Office. On Monday there is a like increase from the same cause. But the most striking regular irregularity

occurs on the 13th and 14th of February. Some people may imagine that St. Valentine's Day is only dear to children and nurserymaids, and that the amorous gush of correspondence that occurs on the anniversary of the saint is declining in these days of enlightenment. Alas! the gush is only becoming more impetuous. In the year 1866 there passed through the London Post Offices for town and country delivery 897,900 valentines, and in 1868 the number had increased to 1,199,142, giving a revenue to the Post Office of £11,242. We have no means of getting at the whole amount of valentines sent throughout the three kingdoms; but, judging from the number despatched from and received in London alone, it must be enormous. But the reader asks, How can the Post Office, without improper prying, find out that they are valentines? A very proper question, but very easily answered. The number is only an estimate. The average daily amount of letters is well known; on these days there was the increase we have mentioned on that average—the inference that they were valentines is, therefore, irresistible.

The sorting of newspapers is effected in a large room ingeniously suspended by iron rods from the roof. They come on Friday nights in such overwhelming numbers that they require a special lift, or rather series of lifts, to take them to the sorting-room: when this process has been accomplished, they are placed in sacks and sent down a shoot into the vans which await them in the yard. The Government has no monopoly in the

carriage of newspapers such as it possesses with respect to letters; consequently, prodigious as the number of the papers is that pass through the Post Office with the impressed stamp, a still larger number go by railway in quires unstamped; and we may state that Mr. Smith, the great newspaper agent, has a sorting-van on the railways, in which he arranges newspapers for his agents and subscribers, just in the same manner as the letters are sorted in the Government railway-travelling Post Offices.

Late letters, as the public are well aware, require extra stamps, according to the lateness of the hour at which they are posted. It is not so well known, however, that at all railway stations from which a travelling Post Office runs there is a box for the receipt of letters for delivery on that particular line of rail up to a quarter of an hour before the starting of the mail. However convenient this arrangement may be to those pressed for time, it does not appear to be taken advantage of, if we may judge from the contents of the letter-box at the Great Western terminus, in which the average number of letters is nine, and the largest number never exceeds twenty daily. Possibly the public do not avail themselves of this arrangement because they are not aware of its existence.

The travelling Post Office, the most ingenious of all the arrangements of the department, is established for the sorting of all the late letters which could not be done in time, and for the sorting of letters received while travelling along the line. It is simply a van

fitted up with pigeon-holes and counters, where, while the train is hurrying at express speed through the dark night, the sorters are hard at work arranging the letters for delivery at the different Post Office district stations down the line. The travelling Post Office stops at long intervals, but it delivers and takes in the mail bags when going at full speed by a special apparatus devised by one of the *employés* of the central office. By the side of the travelling Post Office there is suspended a netting, looking very like a hammock netting, with an opening towards the head of the carriage, and closed at the other end. The bags to be received are hung on the near side of the rail, suspended from an iron standard, and they are swept into the bag by a V-shaped catch just sufficiently strong to do its work, but sufficiently weak to give way rather than destroy anything if it should get in any way entangled. The mail bags fall with a loud thud into the netting, whence they are immediately taken, and the letters they contain are sorted—some of them possibly for a postal district lower down the line. The transfer from the travelling Post Office to the station is made in the same manner as from the station to the travelling Post Office. On two occasions the letter bags, while suspended from the standards, have been stolen, and the contents rifled, and on another two of the registered letters were abstracted. Registered letters are always sent by themselves in a green bag. Every step of their progress is registered by the endorsement of the person through whose hands they

may pass, and such is the security the public place in this method of transmitting money and articles of value that the number has increased from 1,965,000 in 1863, and 2,130,000 in 1864, to 2,232,000 in 1865. This increase was, no doubt, largely due to the regulation by which unregistered letters, unquestionably containing coin, were in 1861 charged with a double registration fee, to be paid by the addressee. The effect of this measure was to lessen the applications for missing letters containing coin from 6,000 to 2,000 per annum. Nevertheless the tendency of a certain class of people to break the wisest regulations, in spirit if not in fact, is evidenced by the increase of letters containing postage stamps. Senders of money in this form possibly believe that by so doing they are not throwing any temptation in the way of the postmen, but we are assured by those versed in the matter at the Post Office that postage stamps, if not felt through the envelope, can be smelt.

The authorities of the Post Office are actively engaged in giving greater accommodation to the public by accelerating the mails, and by supplying a larger number of deliveries. The ideas of Sir Rowland Hill are carried out with a scrupulous integrity, and in this public department at least, since the great reform, it is recognised that the office exists for the public benefit, which is consulted by the energetic secretaries in a manner worthy of imitation by other Governmental departments. When we reflect upon the eminently progressive action of the Post Office service of the present day, we cannot help contrasting it with the

bureaucratic spirit that animated it in old times. Mr. Scudamore, the energetic and able Assistant Secretary, with an evident feeling for the absurd spirit in which postmasters of that time sacrificed the public advantage to greed for making as much money out of the office as possible, quotes from a record of the end of the seventeenth century the following paragraph :—"Some gentlemen of Warwick had requested that the London letters should be sent direct to Warwick instead of through Coventry, by which much time was lost. 'Nay,' said our Postmaster-General, 'from London through Coventry to Warwick is more than eighty miles, so that we can charge 3*d.* per letter going that way, whereas we could only charge 2*d.* per letter if they went direct.'" Let us be thankful that this spirit of "how not to do it" is entirely banished from St. Martin's-le-Grand, which may be called, *par excellence*, the working department of the Government, as it certainly gets more service from its *employés*, at a smaller cost, than any other branch of the public service. While every care has been given towards the collection and rapid conveyance of letters by the Government, the public have not assisted the department as much as they might have done. Possibly the Board of Works are mainly at fault in one particular—the want of care in properly naming and numbering the streets. Builders have created unnecessary difficulties for the postman by the absurd repetition of the word Westbourne, for instance, which is applied to streets, groves, terraces, &c., in the Western District. The nomenclature of streets is especially

worthy of the supervision of the Board. There are 50 King Streets, as many Queen Streets, 60 John Streets, 60 William Streets, and upwards of 40 New Streets. Again, the irregular numbering of streets is a great cause of delay in delivering the letters. In some cases the four corner houses are called No. 1. Indeed, in some of the new streets there is no sequence at all in the numbers. The inspector of letter-carriers gives a very singular case in point. He says :—

“On arriving at a house in the middle of a street I observed a brass number—95—on the door, the house on each side being numbered respectively 14 and 16. A woman came to the door, when I requested to be informed why 95 should appear between 14 and 16. She said it was the number of a house she formerly lived at in another street, and it (meaning the brass plate) being a very good one, she thought it would do for her present residence as well as any other!”

Any person walking about London must have observed that even the names of a large number of streets are not painted on the corner houses. The trouble the Post Office authorities have been at in rapidly collecting letters—for many years they have been supplying pillar and letter boxes at the rate of 500 a year—and speedily delivering them, is greatly multiplied by this omission of their duty on the part of the Board of Works in the metropolis, and by kindred authorities in the provinces.

The Returned Letter Office, which is one of the most singular and interesting departments of the General Post Office, is situate in St. Martin's-le-Grand Street, opposite the great building. To this department gravitate all the letters that fail to be delivered throughout

the empire. It will astonish the reader, perhaps, when he is told that this number amounted in the year 1865 to 3,518,000, equal in quantity to the entire annual correspondence of many a German kingdom. Of course we do not mean to say that the whole number failed to reach their destination eventually, or that they were all *bonâ fide* epistles; many were circulars having reference to the general election of that year, many advertising circulars, but the greater proportion were genuine letters. The reasons that led to this large return of correspondence are numerous and singular. It will, perhaps, scarcely be credited that, in 1865, 12,000 letters were posted in Great Britain without any address, and these letters contained valuables, in the form of cheques, notes, and money, to the amount of £3,700. On one occasion £5,000 in notes were sent, improperly addressed, open at the ends, like a book packet. When an attempt has been made at an address, it is sometimes so vague as to create the most profound astonishment at the simplicity of the writer. Thus not long since the "blind men" of this department, as the decipherers of illegible and imperfect addresses are termed, were fairly beaten by the Arcadian simplicity of the following superscription on a genuine letter containing a pair of spectacles:—

"My dear Father in Yorkshire at the white cottage with white pailings."

It had evidently been written by a servant who, having a fond recollection of the paternal home, thought everybody in Yorkshire must be equally acquainted

with it. Bad writing and spelling are a fruitful cause of failure in the delivery of letters. Illiterate persons will often put the whole direction of the letter in one line without stops, or they will leave half of the direction out, or scrawl something that looks more like an Egyptian hieroglyphic than anything else. Where it is possible, the "blind men," versed in the ways of ignorance, correct the address, and where the letters are to all outsiders totally "blind" these experts will make a shrewd guess, which often turns out to be a hit. Some years since a letter came thus addressed :—

"Mr. Owl O'Neil,
At the Post-office."

The "blind man" into whose hands it fell surmised at once that this was a bit of phonetic spelling, and delivered it without hesitation to Sir Rowland Hill, its rightful owner.

Here is another lucid direction for the postman :—

"Mr. —, Travelling Band, one of the Four playing in the
street,
"Persha (Persnore),
"Worcestershire.
"Please to find him if possible."

This address may have been written as an American joke : of course it failed to be delivered :—

"To the Britisher most Ashamed of his Country,
"House of Commons,
"Westminster."

But the following is evidently a genuine epistle from Mrs. Gamp :—

"E. R——, a cook as lived temperry with a Mrs. L—— or some such a name, a shoemaker in Castle Street about No. — Hobern in 1851; try to make this out. She is a Welch person about 5 feet 1 stoutish. Liva in service some ware in London or naboured. London."

In some cases a little badinage goes on outside the envelope; to wit, a letter was thus addressed;—

"The biggest fool in the world,
"Tunbridge."

And endorsed as follows:—

"The Postmaster of Tunbridge cannot decide whom to deliver this to, as he does not know the writer. Cannot find."

Many letters, failing the name of the persons addressed, give descriptions of their occupations or personal appearance. Here are a couple of instances in point:—

"This is for her that 'maka' dresses for ladies, that 'liva' at tother side of rode to

"James Brocklip,
"Edensover,
"Chesterfield."

"This is for the young girl that wears spectacles, who minds 'two babies,'

"30, Sherrif Street,
"Off Prince Edwin Street,
"Liverpool."

Poor persons, we are informed, have a very extraordinary idea of this department of the Post Office, popularly known as the "Dead Letter Office." Letters are continually being received begging the Secretary not to return any more dead letters, as they bring death into the house. One person, after complaining that twenty-four people have died in her immediate neigh-

bourhood since a dead letter had been returned to her from the Post Office, begs the Secretary that, if any more of those dead letters for her should come back, he should "burn them and never send them back to hear of me after that. Our letters get carried, and offered, and done I cannot tell what with, and murders is the end of it. I think this shall even be my last. Your obedient —." The idea seems to be that the head of this department is in actual communication with the King of Terrors, and forwards letters for and from him, and they fear lest by chance they may contain as an enclosure one of his fatal darts.

The "Post Office" is the address of all kinds of persons carrying on illicit correspondence, consequently a rich harvest of odd communications, containing villainous plots, intrigues, and wicked proposals of all kinds, that arrive at this address, sometimes fail to be called for, from prudential reasons; these communications after a time find their way to St. Martin's-le-Grand, are by this office opened, and, if possible, are returned to the writer, which, we need scarcely say, is not often the case, as he forgets to give his address. One letter we were permitted to inspect is directed to the coroner and jury who should sit upon the writer's body, giving them full directions what to do with it. Swindlers find the address "poste restante" very convenient for their purposes. After remaining in a neighbourhood for a sufficient time to fleece the ninnies in it without bringing the police down upon them they decamp, and, of course, all the correspondence for them

finds its way to the Returned Letter department. The world little knows what is going on under its very nose ; it does not suspect the cunning frauds that are perpetrated under what the writers conceive to be the inviolable secrecy of the seal. It believes that extreme credulity is a weakness of the uneducated. Let us glance at a specimen or two of swindling advertisements, which prove that there is no limit to the credulity of mankind irrespectively of station or education. We may observe that there is no breach of confidence in publishing these returned letters, inasmuch as, with respect to the would-be victims, their names are suppressed, while the victimiser's address, in the interest of society, we should only be too glad to hand over to the police. We may at starting state that the following advertisement appeared in several country newspapers—a singularly clever bait held out and duly gorged, as we shall show :—

“ An elderly bachelor of fortune, wishing to amuse himself by testing the credulity of the public, and to benefit and assist others, will send a suitable present of genuine worth, according to the circumstances of the applicant, to all who will send him 17 stamps, demanded merely as a token of confidence. Stamps will be returned with the present, carriage paid. Address (varied according to circumstances).”

What were the number of stamps that flowed into the exchequer in answer to this cunningly-worded advertisement we do not know, but we are informed that between three and four hundred letters, all containing the seventeen stamps, were returned to this department, failing to find him at addresses which were

no doubt too hot to hold him. We select from a few of these the following amiable replies:—

1. "The Rev. — encloses 17 stamps. He is a clergyman with very limited means, and the most useful present to him would be five pounds. If his application be not agreeable, he requests that the stamps be returned."

2. "I have enclosed the 17 stamps, and shall be very pleased to receive any present you will send me, as I am not very well off; what I would like very much would be a *nice black silk dress*, which I should consider a rich reward for my credulity."

3. "Mrs. — presents her compliments to the 'elderly bachelor,' and in order to amuse him by her credulity, encloses 17 stamps, and thus claims the promised present. Her position and circumstances are good, she mixes in good society, and is quite an adept at dancing the polka mazourka. Those details may determine the suitability of the present."

4. "Having read your advertisement testing the 'credulity of the public,' I feel disposed, on my part, to test the upright and honourable intentions of a stranger, contrary to the opinion of some, who tell me it is only a hoax, or, worse, a mere take-in. I therefore, with the honesty of an Irishman, expecting to find the same in an Englishman, beg to say I am a clergyman's wife, mother of nine children, the six eldest fine, enterprising sons; the three youngest, engaging, intelligent girls. We Irish generally have larger hearts than purses. I therefore lay these facts before you, an Englishman, knowing that a Briton's generosity and capabilities are proverbially equal. Hoping I may be able to prove I have formed a correct opinion of advertiser's truthfulness,

"I am, Sir, yours faithfully,

"C. D."

But we may go on giving columns of examples of the manner in which swindlers use the Post Office as a machine for taking in the public. In many cases these letters, not finding any recipient, are the means of discovering the flight of fraudulent debtors, and many a pretty plot has been spoilt by reason of their falling into the hands of the authorities. Every letter, after remaining in the office for a certain time to give

persons an opportunity of claiming it, is opened, and, if possible, sent back to the writer. Nevertheless there are a large number that are destroyed. The official reasons given for non-delivery to the persons addressed are as follows:—One per cent. are dead, 3 per cent. are not called for at Post Offices, 5 per cent. are refused, 5 per cent. are illegibly addressed, 21 per cent. are addressed to persons who have gone away, and 45 per cent. are not known as addressed. About three-fourths of these undelivered letters are returned to the senders. Out of the 600,000,000 letters posted per annum, only 3,000,000 fail to be delivered; in other words, not more than 1 in 200 letters fail, or $\frac{1}{2}$ per cent.

All returned letters containing articles of value, lapsed Post Office money-orders, and books are kept for two years, and, if still unclaimed, are sold at Debenham and Storr's, and the proceeds are carried to the credit of the Life Insurance Office in connection with the Post Office, the sum being added to the extent of 5 per cent. on premiums of those insured.

Newspapers that fail to be delivered in consequence of the wrappers coming off, or returned from the fact of not being stamped, or insufficiently stamped, &c., find their way to this office in large quantities. It is just possible that the department was until very lately chargeable with the miscarriage of many of these, inasmuch as the postage stamps were so thinly covered with gum that they fell off: 1,200,000 got loose in the Post Office in 1865. In the next year this was remedied

by a thicker coating of the adhering material, and the number of loose stamps fell to 760,000. Possibly if people would not lick stamps, but wet them, there would be still fewer failures of both letters and newspapers from this cause. The detained newspapers amount to five sacks a week. They are all torn up, and sold for waste paper. While witnessing this destruction, we could not help thinking that a few of them would be well distributed if sent to our poor-houses and other charitable institutions, where the poor inmates have so little to cheer them in their often enforced idleness. We recommend this idea to the Post Office authorities.

We cannot, within the limits of this article, do more than refer to the many new departments which have of late years been created and placed under the government of the Post Office. The Money-Order Office has grown enormously, and has, in fact, superseded to a very large extent the system of bank drafts. The Savings Bank, with ramifications throughout the country and with a receiving-house in a large percentage of its Post Offices, has become a great establishment in itself, and is every year increasing; the Government Insurances and Annuities Office—all these establishments, which may be considered satellites to the General Post Office, will grow with the growth of the country. At present they are scattered in various buildings, but it is the intention to concentrate them in one large building—to be erected, as soon as all the leases have been obtained, on the site in St. Martin's-

le-Grand opposite the Post Office, extending from Newgate Street to the Bull and Mouth. This building will in course of time, no doubt, surpass in size the General Post Office, and the whole system, under the direction of the Postmaster-General, will probably represent the most powerful, as it is the most profitable, of all the Civil Service departments of the State.

The revenue of the Post Office from all sources has year by year been increasing. From the return published in the year 1865 it appears that the net revenue amounted to £1,482,522. According to the annual increase, that amount cannot now be much under £2,000,000, which is paid into the Exchequer without any deductions. Lord Stanley of Alderley, the late Postmaster-General, clearly anticipated that in a few years it would, without in any way stinting the service, produce an income nearly equal in amount to the income-tax. Such being the case, it will become a question for the consideration of the Government, what we shall do with it. It has been often asserted that the Post Office ought not to be a source of revenue. Possibly not; but we cannot help agreeing with his lordship "that it would be difficult, if not impossible, to devise any mode of raising a public income less burdensome or more equitable in its operation than that which exacts no payment without giving a service in return, and which is not open to the appellation of a tax."

THE ICE TRADE.

DURING tropical weather ice represents a real power in the community, just as in winter coal is an absolute necessary. No doubt, if a few hot summers were to succeed each other, we should speedily find as bountiful supplies of ice as we now do of fuel. The polar circle would be our mines, or we should lie in wait for the magnificent procession of icebergs which, according to Captain Scoresby, issue from their breeding-places in Davis's Straits, and proceed southward until they touch the warm waters of the Gulf Stream, where they are a constant source of danger to passing vessels. A story is told of an American skipper who sailed upon an expedition in search of one of these bergs, grappled it, and promised himself a splendid reward. In tugging the glittering mass into harbour, however, he forgot that its submerged portion was eight times the depth of that which rose above the water-line; consequently he never could get his convoy into any port, and was obliged to abandon it.

The trade in ice is of two kinds—the rough or local ice, which the coster gathers from the ponds and the

artificial pieces of water, and the foreign ice, which is used principally for table purposes. The glittering cubes of pure crystal we are accustomed to see on the fishmongers' slabs and in the windows of the Wenham Lake Ice Company are all procured from Norway. A few years since this company procured their supply from Wenham Lake, near Boston, U.S., but the expense of freight rendered it so costly that they were obliged to seek for sources nearer home. In the hills situated a few miles from Drobäk, in Christiania Fjord, there is a very pure lake, fed entirely by springs, belonging to this company, and from this source all the pure table ice is now supplied. There is a notion that water, while in the act of congelation, is purged from all foreign matter. This is only partially true. All its mineral salts and any colouring matter are eliminated in the process. For this reason the clearness of the ice is no test of its purity; many a glittering lump, when it dissolves, absolutely smells. We state this by way of caution to those who think that the eye is the most perfect test of the purity of this grateful addition to the table. The Wenham Lake Ice Company, when they had satisfied themselves that the piece of water from which they secure their supplies was free from any impurity, not only purchased the lake, but the farms surrounding it, in order to keep it in their own hands and secure it from any deleterious local drainage; and it is from this crystal cup that their translucent crops are gathered year by year. The process of reap-

ing the ice crop is the same in Norway as in America. By the aid of a sharp ice-plough the ice is ruled with parallel lines twenty-one inches apart, and when the whole surface is marked in one direction the plough is set to work at right angles. In this manner the entire field of ice is divided like a chess-board into squares of twenty-one inches, and about a foot in depth; the ice-saw divides these parallel lines, and by the aid of the ice-spade, a sharp wedge-like implement, the blocks are split apart with the utmost rapidity. In America, where the weather is at times changeable, the greatest anxiety is felt while the process of reaping is being carried on, lest a thaw should come on and spoil the harvest. It is gathered in as fast as possible into the ice-houses, which are, in fact, enormous refrigerators, built of pine wood, with double walls two feet apart, the intervening space being filled in with saw-dust, which is one of the cheapest and most readily procurable non-conductors. In Norway, where the cold weather is not so liable to be broken up as in America, the harvest is gathered more at leisure; it is secured in the same manner, however, and the ice-stores are on a very large scale, sufficient to afford a supply for two or sometimes three years. It seems ridiculous to talk of ice two years old; to keep the hand of Time from such a perishable article seems an absurdity; but as a fact, much of the table ice now supplied to us was reaped in the latter end of the year 1868. We are speaking now of the ice supplied by the Wenham

Lake Ice Company. This company prides itself upon supplying only pure ice, but there is scarcely a fjord in Norway in which some trading vessel is not frozen in during the winter months, in which case they ship a cargo and run over to England with the first favourable wind. The voyage, with a fair wind, is not more than four days, and this island imports nearly the whole of the crop. Thus, in 1865, out of 44,823 tons exported, England received 43,359 tons. The block ice is filled in with rough ice, and during its transport to the ice-stores of the company it loses ten per cent. These blocks of ice are treated just like blocks of stone: the tools they are lifted with are similar. Considering the quantities that are dealt with, a certain rough handling is unavoidable. When hoisted out of the ship's side, they are placed in barges and conveyed up to the store-houses, protected from the sun by a tarpaulin, and that a black one. It is therefore extraordinary that the loss by melting is not more than it is during transport. The loss is at least fifty per cent. before it is vended to the purchasers. When the ice-blocks are stored, sawdust is placed in layers between them, and in this manner the rough Cyclopean masonry is built up. If the blocks were placed one upon another without the interposition of any non-conducting substance, the whole would become frozen into one solid mass, which would be very difficult to deal with. The blocks, weighing 1 cwt. and $\frac{1}{2}$ cwt., are forwarded to customers in the country, packed in bags

filled with sawdust. The amount of importation of ice from Norway depends entirely upon the weather here during the preceding winter. It must not be supposed that the main portion of the ice consumed in this country is brought from abroad. Now, as of old, during a hard frost, nine-tenths of the ice used in the year by the fishmongers and the confectioners are procured from local sources. The quantity consumed at table is a flea-bite to that which is employed in the preservation of food, and for this purpose rough ice is cheaper and better, for the reason that it freezes the matters subjected to it quicker than the block ice. Some of the dealers in rough ice store away enormous quantities during a hard winter. Some of the wells belonging to them hold a couple of thousand tons. As it is shovelled in by the costermonger from the parks or the canals, so it remains until the whole is frozen into a solid mass, which has to be broken up with pickaxes when it is required. Fishmongers use very large quantities of this rough ice, and the fishing-smacks are now enabled to remain at sea a week or ten days by the aid of the ice they carry with them to pack away the fish as fast as it is caught. It would be curious to know the quantity of rough ice used by Mr. Gatti in the production of his penny ices, seeing that he boasted of having made a profit of £4,000 a year from this source alone in a late trial for compensation for removal. The import of ice from abroad, then, as we have said, depends upon the quantity of rough

ice in stock from the last winter. Of course tropical weather, such as we had last summer, greatly increases the quantity consumed, both for table purposes and by way of a supplementary supply to our rough ice. For this reason all figures with reference to the imports of this commodity are fallacious as tests of the aggregate quantity consumed. Unlike the Americans, our taste for ice in our drinks depends upon the state of the thermometer. As a rule, the Englishman likes his drink warm; Brother Jonathan, on the contrary, likes it cold. In the States a piece of ice is heard tinkling in the tumbler as often in the winter as in the summer; the American acquires, during the tropical heat, a habit which he continues throughout the arctic cold of his winters. Hence the consumption is pretty uniform throughout the year, and nothing surprises him more when in Europe than the sparse manner in which this, to him, necessary of life is used.

For the last two seasons Paris has been largely supplied with glacier ice from Switzerland. This is a great innovation, and possibly will produce a revolution in the ice trade. The desert mountain-peaks glittering in the sun on many an Alp, hitherto valuable only in a pictorial point of view, may come to be commercially profitable. When that day arrives, good-bye to the picturesque, in one form at least; it will be sledged away to cool the palates of the smug citizens in the continental capitals. In the majority of cases, however, the glaciers are far too inaccessible to

make the ice crops gathered from them commercially valuable.

If the ice trade between America and Europe has fallen off of late years through the greater accessibility of the supply from Norway, the former country still monopolises the supply to the West Indies, the South American continent, and the East Indies, India, and China. The crop of the winter of 1867-8, which seemed to be providentially abundant, in contemplation of the coming hot season, was one of the finest ever known: 88,496 tons were cleared for export from Boston in that year to the countries we have mentioned. The waste on the voyage in these warm latitudes renders block ice so costly in Australia that it is found more economical to produce it artificially by refrigerating machines, and such, worked by steam, capable of freezing thirty tons per day, are now at work cooling the palates of the Australians, whose liberal habits with respect to the consumption of ice partake more of the American character than our own.

The value of ice as a preserver of life, as well as of animal food on the long voyage to our antipodes, has lately been shown in the successful transportation thither of salmon ova. After many failures, consequent upon attempts to preserve them in the same manner as in this country—namely, by placing them in a running stream of water, at the suggestion of Mr. Moscrop, of the Wenham Lake Ice Company—they

were packed in moss and placed between blocks of ice in the ice-well of the ship conveying them. This last experiment succeeded, and young salmon are now plentiful in the rivers and preserves of Tasmania. For thus exporting a valuable form of fish life to our distant children, they, as in duty bound, have attempted to make some adequate return, by sending to the mother country some portion of the animal food which is a mere drug in their own market. Cargoes of beef and mutton in the carcass have been packed in ice and sent home. It arrived quite fresh, but the failure of this process, by which it was hoped to have fed one hemisphere with the redundancy of another, was owing to the fact that iced meat requires to be consumed immediately; the moment the protection of the ice is removed decomposition sets in with a rapidity which prevents any delay in the hands of the salesman. We may mention, by the way, however, that ice having failed, the chemical method of preservation of animal substances, known as Dr. Medlock's process, is possibly destined to accomplish the end required, and experiments are being carried on by the Society of Arts to test its value.

Ice having been successful in preserving fish eggs, it is now being tried in the transportation of the eggs of various birds suited to the Australian colonies, and no doubt the substance that is so inimical to life when long exposed to its influence will speedily be made the

agent in preserving it in its embryotic stage from a too speedy development and death—in annihilating, as it were, the effect of the death-dealing tropical heat, which has hitherto rendered it impossible for the Englishman to surround himself with his accustomed animal life in his new-found home.

END OF VOL. II.

